Service Manual

Mars 9320 T

20" High Resolution
Auto-Trak™ Color Monitor

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CONRAC
CONRAC ELEKTRON GMBH

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CONRAC

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TECHNICAL PROCEDURES

Introduction

Whenever you replace a module within the DAS monitor (trinitron or shadow mask model) , always check the display geometry , convergence , focus and chromaticity before returning it to the owner .

As a general rule , if you replace any board (except the Logic assembly) only slight readjustments should be required since all the data wich determines the display settings remain stored in the EEprom located on the logic board ; in this case , you have only to identify and to perform adjustments required by board-to-board component deviations (tolerances) .

In case of Logic assembly replacement , if you have the possibility to use the same EEprom (U 707) as previously installed on the defective board , no adjustment is required except the LCD backlighting level (R 729 on Logic assy) ; if not , all the video & geometry parameter are to be checked . In addition , all the user memories (preset video modes) are to be stored again .

If the Cathode Ray Tube has been replaced , you should perform focus , convergence and video adjustments and check the geometric settings of the display : raster centering reallignment may be required .
**** WARNING** : do not attempt purity/landing ring adjustments on the D.Y. . All such deflection yoke adjustments have been set by the manufacturer .

Standard alignment conditions

- All the alignments and check procedures are to be carried out with the monitor facing East or West and after a warm-up period of at least 20 min.
****WARNING** : warm-up period is mandatory when adjusting/checking chromaticity and convergence performances .

Tools and test equipments

- medium cross head screwdriver
(rear plastic cover , deflection & power supply EMI shields and CRT acces panel removal)
- small screwdriver (adjustment of trimpot R 723 on Logic board , LCD backlighting)

- CRT color analyzer Minolta II , calibrated by FIMI spectrometer

- convergence gauge (not strictly required) Klein CM7AG or equivalent

- personal computer IBM/AT compatible running DOS version 3.0 or later , equipped with a VGA graphic card (512K RAM) and a RS-232 port

- RS-232 / DAS adapter cable

- DASFIMI software test diskette

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System set up

- place the monitor at least 1 mt far from any metal object or electromagnetic devices and make sure it is facing East or West direction

- after removing the back plastic cover , the aluminium shielding of the deflection board side and the CRT top acces panel , connect the RS-232 adapter cable to the service connector X 806 located on the Main (deflection) board

- connect the other side of the adapter cable to the desired RS-232 port of your P.C.

- connect the video output of the VGA card of your computer to the desired video input of the monitor

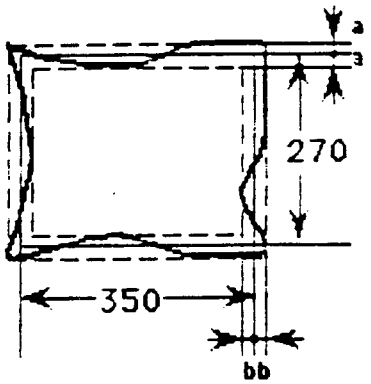
****WARNING** . before attempting to launch any adjustment , read carefully the DASFIMI Test Software user's guide , supplied with the program diskette .
This booklet is also your reference on how to establish proper connection between your P.C. and the monitor and how to use all the adjustment utilities.

ALIGNMENT PROCEDURES

Geometry check and adjustment

To perform the geometry check & adjustment operations , select from the DASFIMI program main menu window the GEOMETRY pattern ; at this moment , proper video pattern and a list of the available commands will be displayed on the monitor .
Then , if necessary , center the active image respect to the bezel by using HOR.PHASE ADJ and VERT.SHIFT ADJ digital controls and adjust the picture size near to the standard value (350 X 270 mm) by using HOR.SIZE ADJ and VERT.SIZE ADJ digital controls .
****WARNING** . the above mentioned digital controls are channel(frequency)related parameters ; any modification performed by using this program will be stored only in the "general"memory area , the one associated to the MODE NOT FOUND condition .
If you wish to modify the picture size & centering for a specific Video Mode , you have to escape from the DASFIMI program and follow the standard procedure as described in the User's Manual of the monitor .
In any case , at this step this operation is not required to continue the geometry alignment .

Once the image has been centered and set to proper size , check the total geometric distortion according to the following limit :



a ≤ 1,8mm
b ≤ 1,8mm

Size Standard and Total Geometric Distortion

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- Digitally controlled service controls list

(available via RS-232 port by using a remote ASCII terminal or P.C. with terminal emulation package)

*HORIZONTAL WIDTH
HORIZONTAL LINEARITY
*HORIZONTAL PHASE
HORIZONTAL D.C. SHIFT
PIN CUSHION CORRECTION
PIN CUSHION BALANCE
PARALLELOGRAM CORRECTION
KEYSTONE CORRECTION

*VERTICAL HEIGHT
VERTICAL LINEARITY
*VERTICAL D.C. SHIFT

*HORIZONTAL STATIC CONVERGENCE
*VERTICAL STATIC CONVERGENCE
VERTICAL TOP DYNAMIC CONVERGENCE
VERTICAL BOTTOM DYNAMIC CONVERGENCE

RED LEVEL (CUT-OFF) CONTROL
GREEN LEVEL (CUT-OFF) CONTROL
BLUE LEVEL (CUT-OFF) CONTROL
*CONTRAST CONTROL
*RED GAIN CONTROL
*GREEN GAIN CONTROL
*BLUE GAIN CONTROL
*BRIGHTNESS CONTROL
BRIGHTNESS PRESET

NOTE : the * mark identifies all the controls which are also user's controls ; see user's manual about the front keypad operation.

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- Analog service controls list

Location : Focus pack

FOCUS 1
FOCUS 2
SCREEN (G2 voltage)

Location : top of High Voltage generator module

HORIZONTAL STATIC CONVERGENCE PRESET

Location : Power Supply board

OUTPUT VOLTAGE ADJUST (R 648)

Location : Logic board

L.C.D. POLARIZATION ADJUST (R 723)

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List of equipments needed to repair C2x82 DAS Monitors

1- PC with RS232 Serial output, VGA card 512 K memory.

2- Interface cable.

3- DASFIMI software floppy-disk.

4- Multimeter.

5- Oscilloscope 100 MHz.

6- Misconvergence ruler (Klein gauge type CM7AG).

7- Color analyzer (Minolta TV II).

8- Screwdrivers.

9- Demagnetizer (Type Hozan nº 21).

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C 2082 DAS - Repair tips

TROUBLESHOOTING BACKGROUNDS

When you are facing a problem , first of all try to understand which kind of problem is it and where is coming from .

If you can see a picture on the screen , usually you should be able to understand the problem looking at the screen itself and take the appropriate corrective actions . When you find a problem looking at the screen , before changing any FRU , check if it is possible to solve the problem by readjusting the related controls .

Many times , when you see the picture , the problem is not real failure but only a misadjustment since in most cases of failure (or uncorrect operation) a protection circuit will blank the screen .

The DAS has a built in self diagnostic test performed by the logic board which is able to check if some important circuits are properly working , such as deflections , EHT , etc. , and in case of failure an error message is displayed on the front panel LCD .

Additional diag. indicators are the LEDs placed on the Power Supply.

By following the herebelow procedure , you should be able to find the defective board to be replaced.

A) <u>After turning the monitor ON , the CRT is blanked but the LCD is lighted.</u>

- This means that the mains power is connected and the separated +5V switch mode power supply is working .

At this moment , you should read on the LCD one of the following error messages :

1) H/V or H. or V. SYNC OFF

- This means that the displayed type of sync is missing ; check the connections between monitor & video generator and check if the selected video input (BNC's or D-SUB) is the right one.

If everything seems to be OK , check the internal cabling between VIDEO AMPLIFIERS , VIDEO INTERFACE , MAIN BOARD & LOGIC BOARD.

If the cabling is OK , the VIDEO AMP board is suspected to be failed.

2) H. DEF. FAILURE

- This means that the horizontal deflection is missing , nevertheless the vertical deflection is working and so the power supply output short circuit protection hasn't been activated .

In this case you should check the deflection yoke connection (X811) and if all the supply voltages , especially the + 200V , are present on the Main Board (X807).

If all seems to be OK , the MAIN board is suspected.

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3) V. DEF. FAILURE
- Same meaning and procedure as per 2)

4) HI. VOL. FAILURE
- This means that the High Voltage that supplies the CRT is missing , nevertheless both horizontal & vertical deflections are properly working.
In this case , first of all try to recover the problem by switching the monitor of and on again because the overcurrent protection of the High Voltage Generator could be activated by a flashover discharge or really by a too high beam current (for example if the video input termination switch is in the wrong position) ; if this does not solve the problem , check the connection between the H.V.Gen and the Main board (X803) and the fuse F801 placed on the Main board.
If all seems to be OK , the HIGH VOLTAGE generator is suspected.

5) GEN.(general)FAILURE
- This means that at least two of the above mentioned failures have been detected at the same time.
It can happen when a local failure cause a short circuit on one or more supply voltages , activating in this way the protection of the power supply so that also the non-failed circuits cannot work or when the power supply itself is bad , or when a supply voltage is missing on the Main board.
In this case , you should proceed in this way :

a) Check the LEDs placed on the power supply.
V621 must be on because if you can see the LCD message the separated circuit which supplies the +5V must be working.
If also the other 3 LEDs are on , means the also the main power supply is working . In this case check if any supply voltage is missing on the Main board (due to the cabling) ; if not , the MAIN board is suspected.

If the other 3 LEDs are off or blinking , disconnect the Power supply output connector X606 and check the LED again : if they are still off , the power supply is suspected.

If they are on , means that with X 606 connected the SMPS overcurrent protection is activated because there's a short circuit on one of the supply rails .In this case , plug in again X 606 and disconnect one at time the supply connectors of all the other boards , following this order : DEGAUSS board , EHT generator , MAIN board , VIDEO AMP board , VIDEO INTERFACE board .
When the SMPS starts working , the FRU which has been disconnected is bad .

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B) After turning the monitor on , the CRT is blanked and the LCD is off.

In this case, check the LEDs on the power supply.

1) All the LEDs are off :

check all the connections between the EMI filter, line switch , line fuse (check the fuse itself) and the SMPS board : if all looks correct , replace the power supply .

2) Only the LED V621(+5V indicator) is off:

unplug the power supply connector X606 and check again the LED status

- if it is still off , replace the power supply

- if it is on , means that there's a short circuit on the +5V line ; in this case apply the procedure described at paragraph " GEN FAILURE" indication in order to find the defective board.

3) All the LEDs are on :

check if the +5V supply voltage is present on the Main board (X807) and if the cabling between the Main board itself and the Logic board is correct ; if yes , the LOGIC BOARD and/or the LCD assembly is suspected.

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- LIST OF ADJUSTMENT NEEDED IN CASE OF FRU REPLACEMENT

Power Supply board :

Already factory adjusted.

Degauss board :

No adjustment needed

Main board

Geometry readjustment: see section xxx? service manual.

H & V free running freq. already factory adjusted .

High Voltage Generator :

Already factory adjusted.

Video interface board :

Basically , no adjustment should be required ; check in any case the chromaticity and if necessary readjust the Video amplifiers (see section xxx? service manual)

Video amplifiers board :

Same as per Video interface point.

Logic board :

In case of logic board replacement , if you have the possibility to place on the new board the EEprom (U 707) originally mounted on the defective board to be replaced you don't need to readjust any item since this IC contains all the original monitor set up ; the only required adjustment is the polarization (the best character view) of the LCD by means of R 723 .

If you can't use the old EEprom , a complete new monitor set up including geometry , chromaticity , memory channels setting will be required (see service manual) .

C.R.T.

Geometry adjustement: see section xxx? service manual.

Focus adjustement: see section xxx? service manual.

Video adjustement: see section xxx? service manual.

H & V convergence adjustment : see section xxx? service man.

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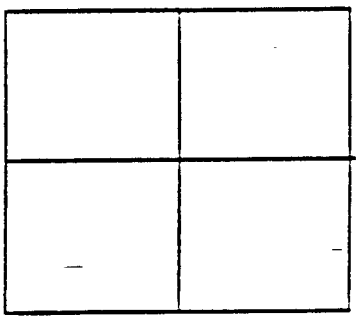
ALIGNMENT PROCEDURE FOR 20" COLOR MONITOR

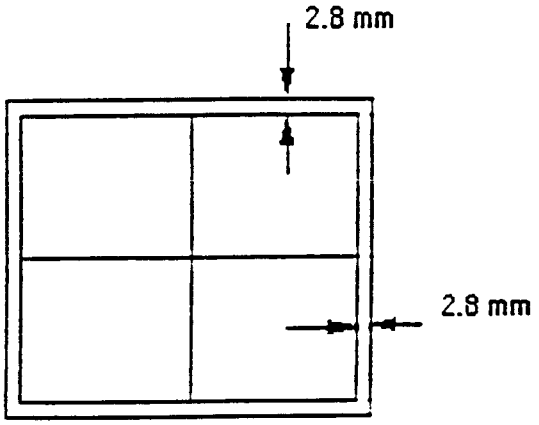
INFORMATION ONLY

GEOMETRY

Geometry is adjusted using a template and a test pattern as shown below:



Test Pattern



Template Pattern

Start with all geometry controls in middle position ; reference timing should be 64 kHz/60 Hz .
Adjust controls in the following order:

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CONTROL NAME	ACTION
H. DC Shift	Center raster area respect to bezel
H.Phase	Center picture respect to raster
V. Linearity	Adjust until top and bottom halves of the picture are same height
V. Shift	Center picture respect to the raster
V Size	Adjust picture height to nominal value
Parallelogram	Adjust to have a vertical centerline
Side pin. balance	Adjust until the vertical centerline is perfectly straight (not bowed left or right)
Side pincushion	Adjust until side lines are perfectly straight
Keystone	Adjust until side lines are parallel
H Size	Adjust picture width to nominal value

Check that outer lines of test pattern fall inside rails of template, and correct for deviations if necessary.

VIDEO

Video adjustments (cut-off levels and white balance) are performed using a color tv analyzer. The analyzer is calibrated to the required color temperature using Gamma Scientific equipment.

Start with all controls (Contrast, G2, R-G-B gain, R-G-B levels, brightness preset ,) set for minimum brightness except for the Brightness control , set to the maximum .

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Cut-off: the analyzer is set for maximum sensitivity and the probe is positioned at the center of the screen. A blank screen with no video set up is displayed; G2 is increased until the first color appears, and then the level controls of the other two colors are adjusted to have the same reading on the analyzer. This give a background raster brightness of approx. 0.3 ftl . At the end , G1 voltage is decreased down to the original value (Bright. preset control set to minimum).

Gain: a full white page is displayed. Contrast control is set to maximum and the R-G-B gain controls are adjusted to have the correct analyzer reading.

Example: using a Minolta Chroma Meter you have to store the reading of a reference CRT, then you will have a reading of 100 for each color when working in the analyzer mode. Note that sensitivity of Minolta is not enough to adjust cut-off as we do in our factory.

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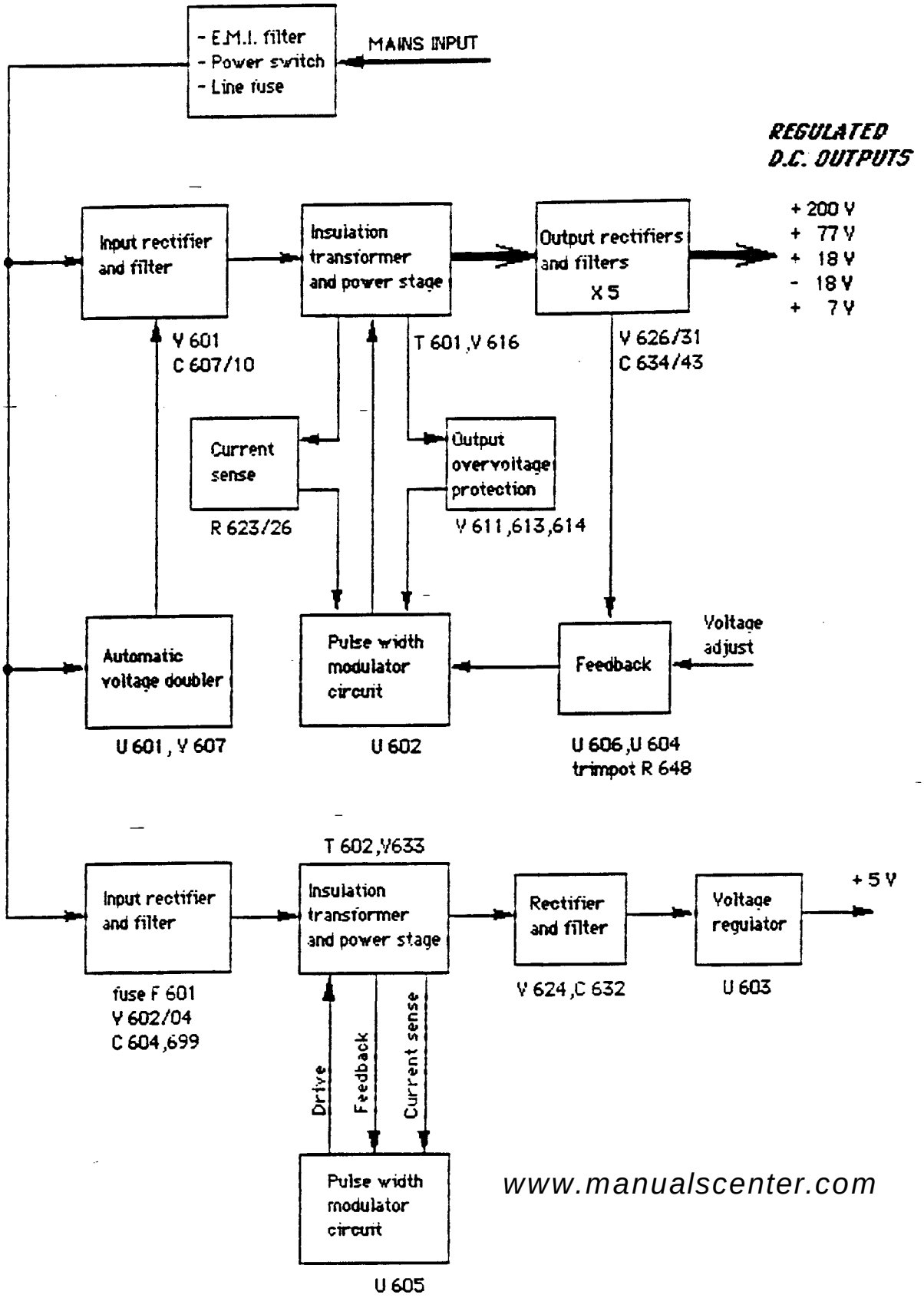
C 2082 DAS block diagrams : Power Supply board



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Power Supply board

- The Power Supply of the DAS monitor consists of two separate converters, both working in flyback and current mode .
The first one , the main P.S. , deliveres power to all the analog circuits of the monitor , such as deflections , video amps , high voltage , ... ; the second converter supplies only the + 5 V to all the logic circuits and it is completely independent from the main P.S. .
The aim of having two different P.S. is to allow the microprocessor to give diagnostic on the LCD in case of failure , also if the failure enables the short circuit protection of the main P.S. that will stop working . In addition , at power on , the logic supply must be present before the power circuits of the monitor begins to work , in-order to avoid components stress due to wrong drive signals .

+ 5 V Power Supply

- At power on , the PWM circuit of U 605 is supplied from the mains power (rectified and filtered by V 602,603,604,605 and C604) via R 631 ; the I.C. starts working when the supply reaches 16 V and then , as soon as the converter starts working , it remains supplied by V 622 , C 629 and V 620 .
This feedback voltage (pin 2) is compared with the current waveform at pin 3 derived from the output stage (R 653,654,655) and the resulting square wave signal drives directly the output Mosfet V 633 .
Network made by R 649 and C 647 set the working frequency at about 115 kHz .
The square wave at pin 8 of the switching transformer T 602 is rectified and filtered (V 624 , C 632) , and then series regulated by U 603 .
LED diode V 621 indicates if the primary side of the P.S. is working ; LED diode V 625 indicates if the + 5 v output of the series regulator is present .
This converter receives mains power via an additional fuse F 601 placed on the PCB itself .

Main Power Supply

- The PWM start up procedure at monitor power on is similar to the one above mentioned , except for this points :
a) the voltage derived from the mains is not taken directly from the rectified voltage which supplies the conversion circuit but separately (via V 608 , C 613) , in order to have a turn on/off time independent from the output power .
b) the voltage coming from the primary side of the power transformer (pin 5 , called also Vaux) which supplies the PWM I.C. after the power on sequence , is not used to close the voltage feedback loop (the feedback voltage is taken on the secondary side) but only to sense overvoltage conditions .When this voltage reaches the trip value of circuit V 613,614

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determined by V611 , the PWM circuit will switch the output PowerMos off.
Network of V 618,C 623,R 629 and V 619 provides a soft start of the P.S. .
The PWM I.C. U 602 receives voltage feedback from the optocoupler circuit of U 604 , which senses the + 200V output voltage via a resistor divider ; the output of the internal error amp (pins 1 & 2) is than compared with the current sensing waveform at pin 3 and the resulting square wave drives the output device V 616 .
The operating frequency is set at about 80kHz by R 628 and C 620
When a output short circuit occours (except for the +7V line , protected by a fuse) , the current on the primary winding increases ; since the maximum acceptable voltage at pin 3 of U 602 (which is the current sense input) is 1V , the maximum current flowing in the output Mosfet cannot surpass 1V/Rsense where R sense is R623/624/625/626 . When this value is reached , the P.S. is switched off and a new start up procedure will occour ; so , a hiccup operation is activated until the short circuit condition remains .

Voltage doubler

- Since the main converter is optimized to work in the 220V A.C. power range , for the operation a 110 Vac a input voltage doubler is required .
Key components of this circuit are U 601, a dedicated I.C. , and triac V 607 .
The trip point of the doubler is set at nearly 145V by means of the resistor divider of R 609/611 ; when the voltage falls down this value , the triac is switched on connecting an input phase of the AC line to the central point of the "bulk" capacitors configuration of C 607/609 .
This operation is made automatically and without the needing of a restart .

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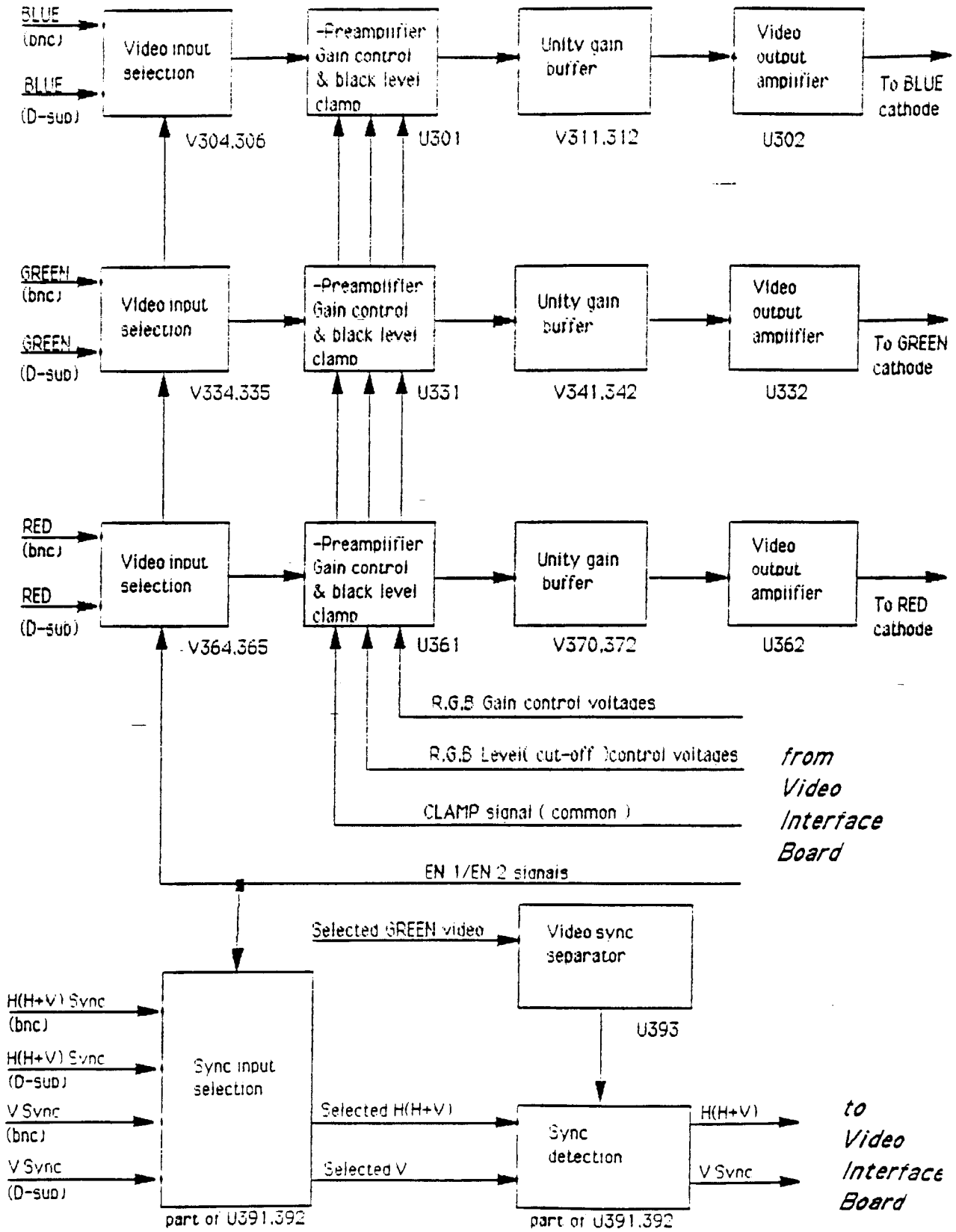
C2082 DAS block diagrams : Video Amplifiers board



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Video Amplifiers board

The Video Amplifiers Board consists of an input selection circuit, a preamplifier stage, a buffer stage, an output stage (all for each channel), a sync input selection and detection circuit and a video sync separator circuit . Only on the BNCs video inputs there s the possibility to choose the input impedance between 75 ohms and HIGH by using an external switch . This switch is joined to a plastic slide that contains three small magnets and depending on the position of this slide,the magnets are able to activate or not the dry reed switches connected in series to the 75 ohms termination resistors.

When operating with HIGH mode, the input impedance is nearly 4,7 kohms .

VIDEO PROCESSING DESCRIPTION (Green channel)

The video signal coming from the BNC input (G-in1) after passing the decoupling capacitor C 331 is fed to the base of transistor V 344 ; the video from the D-sub input (G-in2) is fed via C 332 to the base of V 336 .

Those transistors in the emitter follower configuration perform the selection between the two video signals : if signal EN1 is TTL high , diode V 333 does not conduct. V 334 receives base polarization via R 333 (bias voltage is nearly 2,5 V and it is supplied by the video preamp. section) and so the BNC video is enabled : at the same time , signal EN2 which is complementary to EN1 is low, forcing to ground the base of V336 and so the D-sub video is disabled .

By using the "INPUT SEL" key located on the front keypad is possible to change the status of EN1 & EN2 signals in order to select the desired video input . After passing this stage, the selected video signal is fed to the video preamplifier circuit.

The function of video preamplifier is accomplished by the LM 1201 I.C. (U 331) which performs the black level restoration and the gain control . The incoming video signal is fed to pin 16 , the gain voltage control (G-GAIN) to pin 4, the black level voltage control (G-LEVEL) to pin 9 , the backporch CLAMP signal to pin 5 , and the feedback signal coming from the output stage is fed to pin 6 .

When signal CLAMP is present , the reference voltage present on pin 9 (adjustable with GREEN CUT-OFF digital control) is compared with the feedback signal and , changing its polarization , the LM 1201 is able to keep the black level constant .Acting on GREEN GAIN digital control is possible to adjust the gain of the preamplifier .

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Since the input impedance of the output amplifier is very low, in order not to affect the performances of the LM 1201 (rise/fall time) an unity-gain output buffer is required (complementary high frequency transistors V 341-V 342).

After buffering , the video drive signal is fed to the output amplifier OM 976 , a hybrid video amplifier . The gain of the output stage is Av = Rh / (R 352-R353) where Rh is internal to the hybrid module . Capacitor C 353 performs the high frequency compensation of the input network .

The function of diodes V343-344 is to protect the output stage against CRT flashover discharges .

SYNC PROCESSING DESCRIPTION

The aim of this circuit is to select the TTL sync signal associated to the selected video input and to enable the sync stripper circuit output if the TTL sync is not present.

The Horizontal or combined sync coming from the BNC input (H-H+V) is fed to one input of standard open collector nand gate (pin 5 of U 392) ; the one from the D-sub input (H1) is fed to a similar circuit (pin 13 of U 391).The output of those nand gates are connected to the same pull up resistor (R 395) and so when signal EN1 is TTL high the BNC sync is selected. when it is low (and so EN2 goes high) the D-sub input is selected.

The same concept is used for the selection of the Vertical sync.

U 393 (LM 1881 I.C.) performs the video/sync separation of the selected GREEN video line: at its output (pin 1) is present the combined sync extracted from the video signal , amplified at TTL level .

This signal can reach the Horizontal Oscillator board only when no separate TTL sync signal is present (and so pin 8 of U 391 goes high) because the external sync has priority respect to the sync on the GREEN video .

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Video interface board

The video interface board consists of three main blocks : a D/A conversion circuit , a grid 1 circuitry and an interface circuit between supply voltages coming from the SMPS and the Video Amp. board which includes series regulators (U 421.422), heater drop resistor R421 and EMI filters .

The D/A conversion circuit is built around U 423 (DAC 8800), a octal 8-bit digital to analog converter which provides a very precise programmable voltage output adjustment capability , in order to control the gain & cut-off DC inputs of the video preamplifiers .

Changing the programming output voltage of each DAC is accomplished by clocking in an 11-bit serial data word into pin SDI (DAT OUT 2 signal) . The format of this data word is 3 address bits (MSB first) which identifies the DAC to be updated , followed by 8 data bits (D) for the output voltage control. When signal ST is present , the data bits are transferred from the serial input register into the decoded DAC register .

The output voltage range is determined by the DC voltage applied to VrefH & VrefL inputs (VH1.VL1 for DACs A-B-C-D and VH2.VL2 for DACs E-F-G-H) .

The actual output voltage, Vout , depends on VrefH & L as follows : Vout(D) = D x (VrefH - VrefL) / 256 + VrefL where D value is from 0 to 255 .

In this application VH1 is 5.1 Volts , VL1 is 3.5 Volts and so these are the full scale and zero scale values for the DAC outputs A-B-C-D (R.G.B LEVEL controls & CONTRAST control) ; D output , amplified by U 424 is used to drive VH2 reference input (VL2 = 1/2 x VH2) which determines the range of the DAC outputs E-F-G (R.G.B GAIN controls) , performing in this way the general CONTRAST control .

Signal ABL (automatic beam limiter) coming from the High Voltage Gen. is able to pull down the contrast control voltage when the picture on the screen is too bright , in order to reduce the gain of the video amplifiers.

Grid 1 circuitry

Signal BRIGHT , coming from the LS board , sets the G 1 negative voltage for brightness control (the range is from -20V to -30V approx.) by changing the emitter reference of V 434 . During vertical flyback G 1 voltage is sent to a more negative level via C 437/467 & R 492/493 - V 426 in order to blank the retrace .

The spot protection circuit (V 434-V432) is able to blank the screen sending G1 to the maximum negative level (- 200V) at the power off or when the guard circuit on the Main Board detects that one or both H and V deflections are missing , and also during the transition between two frequencies (signal H-V).

V 438 , V 431 form a voltage stabilizer in order to avoid brightness changes due to video content variations (EHT load variations).

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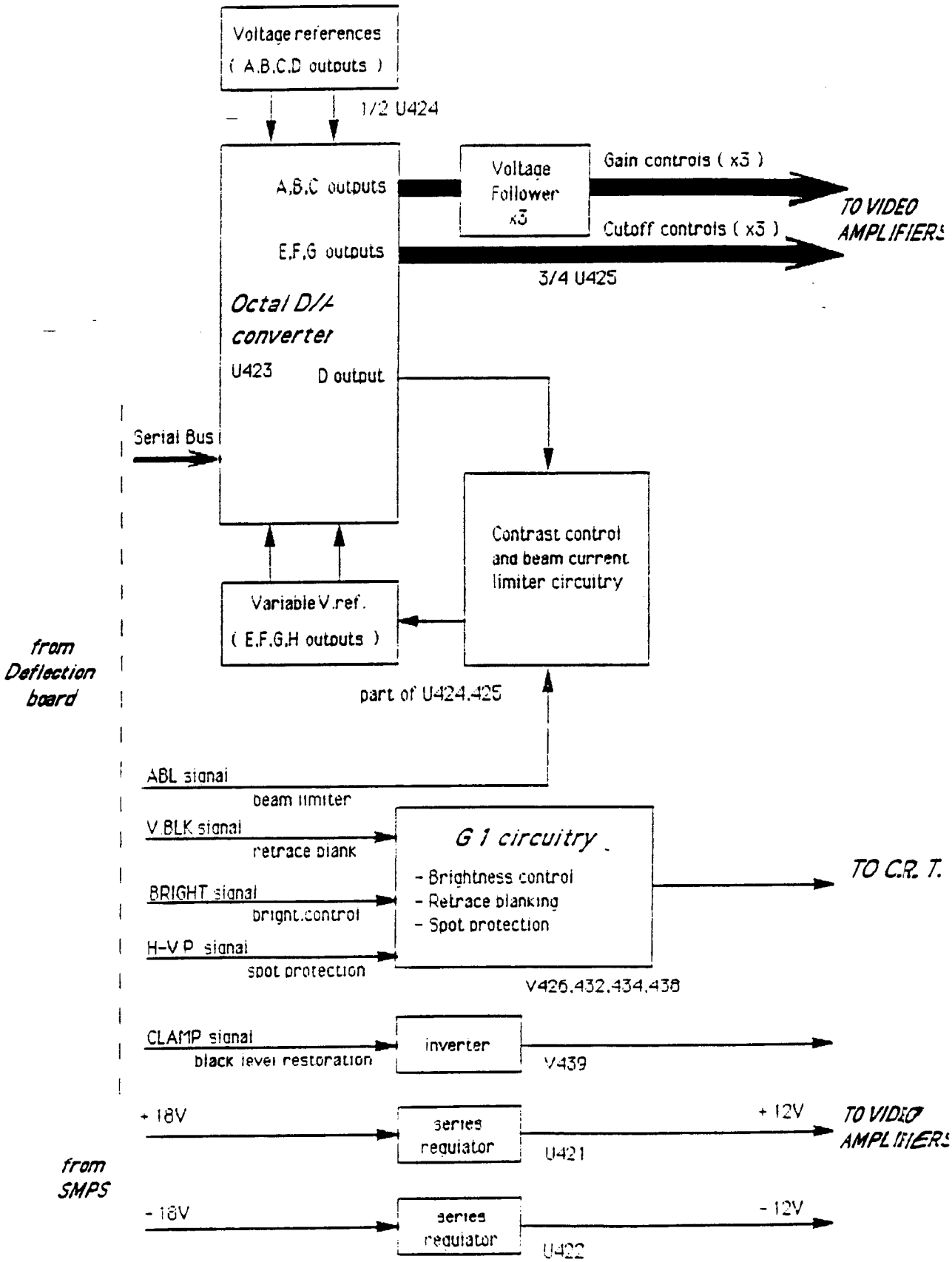
C 2082 DAS block diagrams : Video Interface board



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Vertical output stage

- The vertical output stage is built around the TDA 8179 I.C. (U 807) , a vertical deflection booster . It receives drive signal (V DRIVE) from the LSboard and DC power from the +18 and -18 supply rails .
This I.C. has an internal generator which is able to increase the supply voltage during flyback , in order to reduce the vertical retrace time .

Deflection & HV guard circuits

- The purpose of the deflection guard circuit is to prevent spot burning of the CRT at power off or if the deflection fails . A five transistor circuit monitors both horizontal and vertical deflections .
Capacitor C 854 is charged during scan and discharged periodically by the presence of proper horizontal flyback pulse . As long as the resulting sawtooth does not exceed the 6,2 volts of zener diode V 858 , the collector of transistor V 860 (signal HVP) is high and no action is taken . The vertical guard is identical except for the value of sawtooth capacitor .
If either deflection disappears , signal HVP goes low ; this information is sent to the remaining part of the circuit located on the Video Interface board , pulling down G1 drive to a very negative value , overriding the actual video drive on the cathode .
Signal BLANK (base of V 889) is controlled by the microprocessor in order to blank the screen during the transition between two frequencies or when any malfunctioning is detected (sync missing , freq out of range , ...) .
High voltage guard is performed by sensing the presence of the -200V output of the HV generator , by means of zener diodes V 870,871,872 and transistor V 826 ; the resulting TTL level information is sent together with deflection informations (signals HFAIL , VFAIL) to the microprocessor , after a parallel to serial conversion done by U 806 , for LCD diagnostic purposes .

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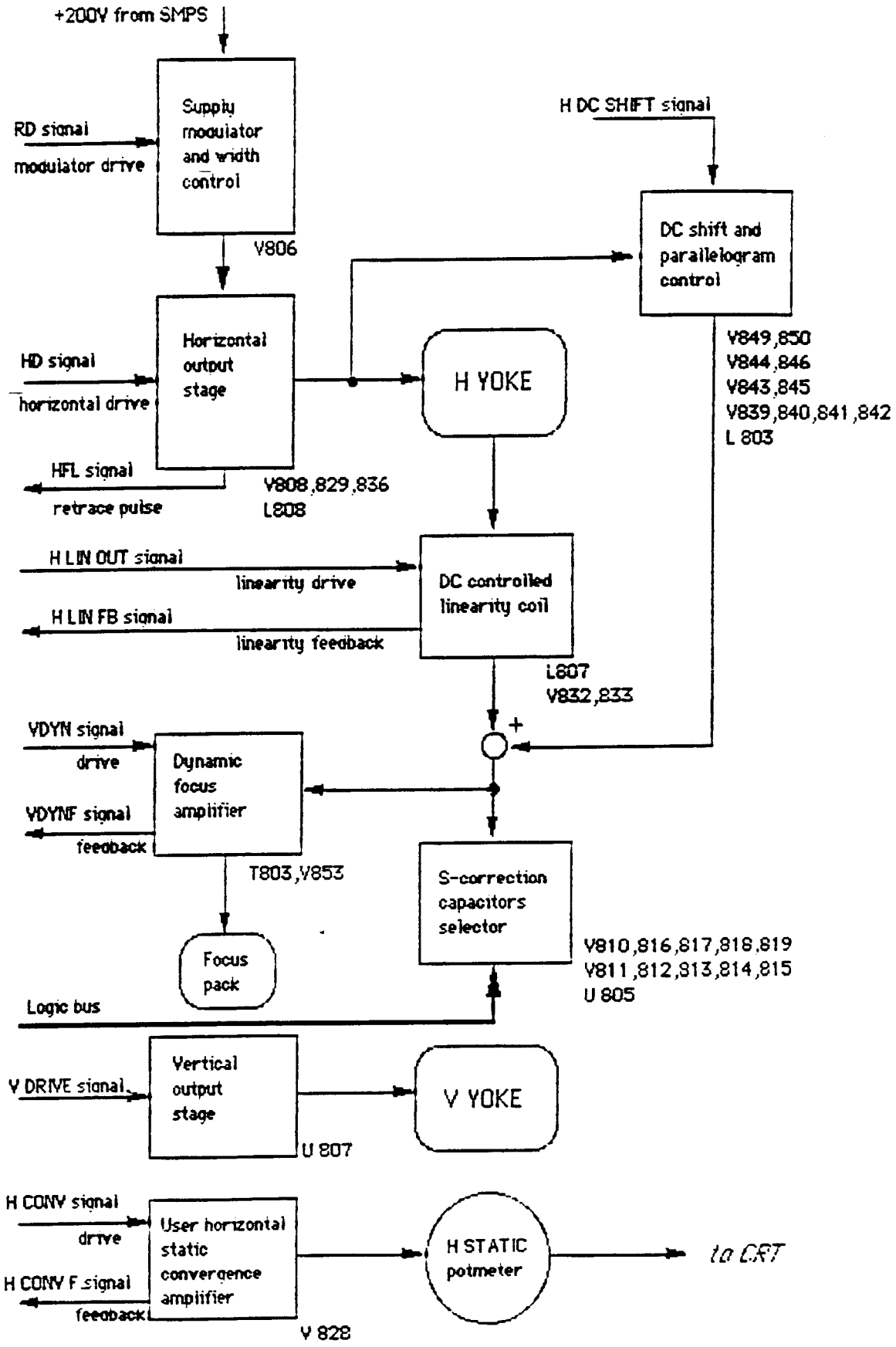
C 2082 DAS block diagrams : Main board



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to the fixed cap (C 806) other five correction caps (C 807 , 808/809 ,810 , 811 , 813).
Switching of the capacitors is done by means of Power Mosfets (V 810 , 816 , 817 , 818 , 819) controlled by serial bus DATA OUT after a serial to parallel conversion (shift register U 805) and after buffering (V 811/15) .
The insertion table of the S- caps is stored into the monitor Eprom , so that the microprocessor can change the total capacitance value according to the actual horizontal frequency .

Dynamic focus amplifier

- The difference between the electron beam path lengths for axial beams and beams deflected to the corners of the tube produces variations in focus requirements from the center to the edges of the CRT . This is corrected by providing a parabolic dynamic focus voltage waveform at both line and field frequencies .
The line frequency parabolic waveform is obtained by amplifying with current transformer T 803 the parabola present on the s-correction caps ; the secondary winding of this transformer (pin 4) is modulated with a vertical frequency parabolic signal (VDYN signal coming from LSboard , amplified by V 853 which takes DC power from the deflection choke thru diode V 805/C 804) .
The sum of vertical and horizontal waveforms are AC coupled to DC focus potential inside the focus pack and applied to the CRT .
Resistors R 878,879 and diodes V 852 1,852 form a flashover protection network

Horizontal static convergence amplifier

- The horizontal static convergence control in a Trinitron tube is accomplished by changing the high voltage DC potential present on the convergence plate inside the electron gun . This is done by connecting a high voltage potmeter between the RCV pin of the gun(connected internally to the anode voltage via a resistor divider) and ground .
In order to have a digital control , this potmeter has been connected to the output of a DC amplifier ,whose range is from 0 to 800v and allows the user to adjust misconvergence on the vertical lines within 1,5mm approx .
DC amplifier is made by transistor V 828 that receives DC power from the horizontal deflection thru rectifier diode V 824 and filter C 823 , and is driven by signal H CONV generated on the LSboard .

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Horizontal DC shift

- The aim of this circuit is to introduce in the deflection yoke a DC current in order to recover the electrical centering spread of the CRT production .
The circuit mainly consists of inductance L 803 , diodes V 840 & 839 , resistors R 870 & 871 and transistors V 843 & 845 .
L 803 is connected in parallel to the yoke thru the rest of the circuit .
When both transistors V 843 & 845 are opened , positive current flowing into R 870 and negative current flowing into R 871 develop across those resistors equal and opposite voltages , so that their sum is zero and there's no raster shift .
When one of the two transistors becomes conductive , the voltage across the corresponding resistor decreases , unbalancing the circuit . In this way a DC voltage is developed across the circuit forcing a DC current into the yoke thru L 803 .
Since all the circuit is floating and a DC control is needed , the circuit has been designed in order to be current driven ; the amount o fthe shift depends on the current flowing into R 872 .
V 849 sources a constant current while V 850 sinks a variable current : the difference between these two currents flows into R 872 .
The drive signal H DC SHIFT (coming from the LSboard) can be modulated with saw & para waveforms at field frequency , allowing in this way paralleleogram and side pin. balance corrections .

Horizontal linearity coil

- The linearity coil L 807 used for the DAS monitor has been designed in order to allow a DC control of the correction value . DC control has been achieved by replacing the permanent magnet that allows linearity adjustment by its rotation with an additional winding that performs the same function by changing the drive current , which determines the magnetic field .
This control winding is driven by signal H LIN OUT (coming from the LSboard) , via the complementary pair current amplifier of V 832,833 .
The value of the correction is different for each frequency and is given from an experimental table stored in the monitor Eprom , in such a way that the microprocessor is able to change the linearity data when working at different frequencies .

S - correction capacitors selection

- In order to obtain a correct s-shaped scan current , the value of the s-correction cap must be changed at different operating frequencies .
Since this monitor is an autoscan monitor with a wide line frequency range, an s-correction capacitors selection has been provided by adding in parallel

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Main Board

- On the Main board are located all the power & high voltage circuits (except the separated high voltage power supply) such as deflections , focus & convergence high voltage amplifiers and several others circuits .

Horizontal output stage

- The horizontal output stage consists of three Power Mosfets (V 836, 829, 808) in series configuration ; since this kind of devices require only voltage drive (in a standard transistor stage a current drive is required), signal HD coming from the LSboard is directly used to switch V 836 on and off , without any transformer boost . Other two output mosfets V829 & 808 are source driven by V 836 itself : they receive always gate drive by means of diodes V 823, 801 connected to the +18 supply voltage but they can conduct only when the directly driven mosfet is switched on by HD signal . V 835,837 and 838 form a speed-up network for V 836 ; two identical networks are used to drive V 829 and V 808 .
Three flyback capacitors (C 820, 805, 801) are used to divide in almost equal parts the total flyback voltage , in such a way that each output mosfet is working within its correct Vgs range .
Since every Power Mosfet has a built in high speed diode , in this circuit there's no need of an external damper diode ; ferrite beads with damper resistors are connect in series to the Source terminal of each output mosfet, in order to avoid ringing at the beginning of the scan due to the high switching speed of these devices .
The horizontal output stage is connected to the modulated supply rail thru deflection choke L 808 .

Horizontal supply modulator

- The horizontal supply modulator circuit of V 806,V804 provides DC power to the output circuit (thru damper network R804/C803/L802 and decoupling coil L808), starting from the +200V supply rail .
To keep the raster size constant at any line frequency , the value of the resulting DC voltage (that is modulated with a vertical period parabolic waveform , to correct geometrical distortions in the east-west direction) must be changed when the line frequency changes , and this is achieved by controlling the duty cycle of the drive signal RD , coming from the LSboard : since the peak value of the flyback pulse is determined by the on-time of V806 , by keeping this time constant we can supply the output stage with the correct DC power regardless of the frequency.
Acting on signal RD , the amplitude and the shape of the parabolic correction and the duty cycle of the step-down converter V 806 can be adjusted, performing in this way the side-pincushion/keystone and the horizontal size control .

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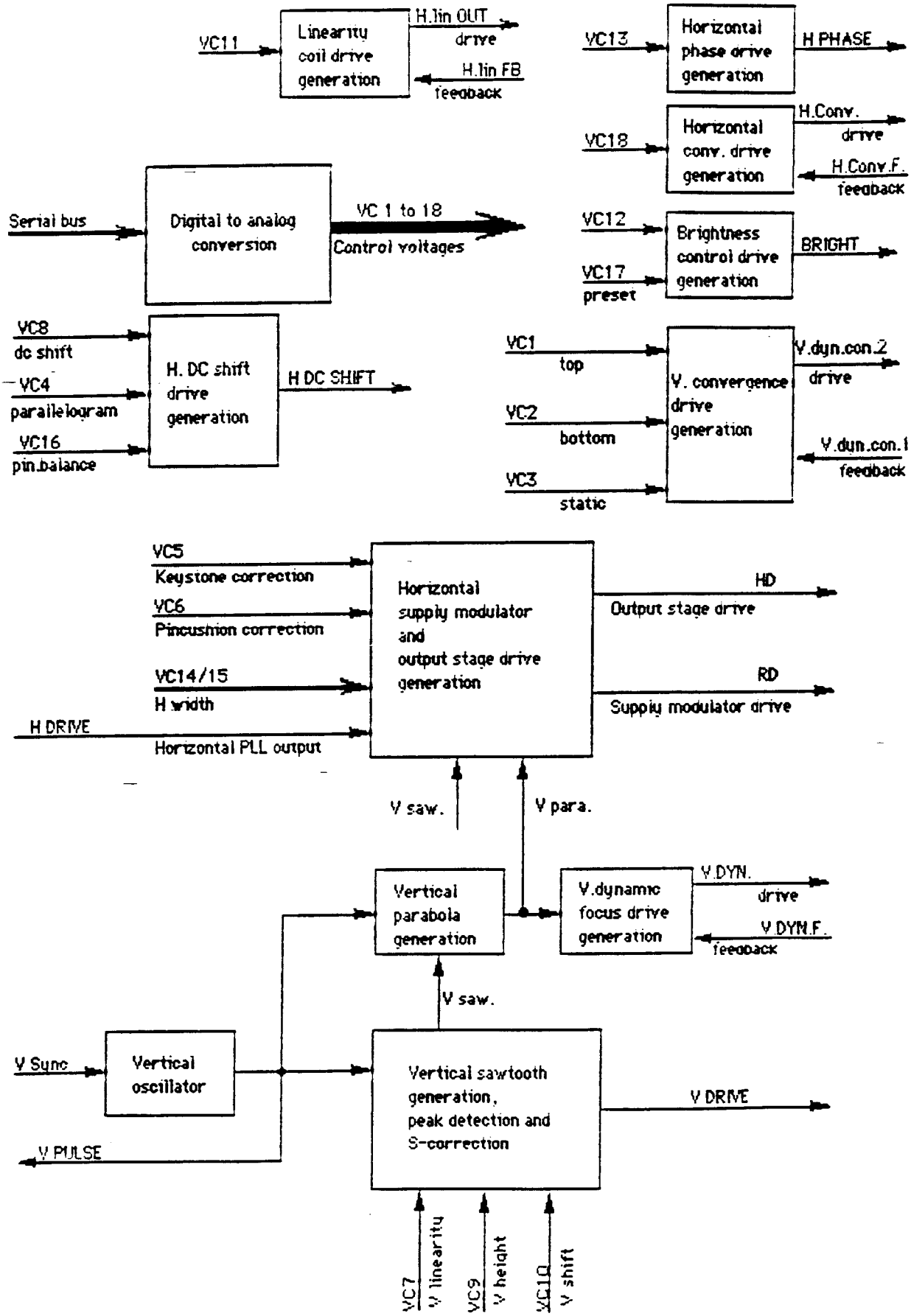
C 2082 DAS block diagrams : Low Signals board



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LOW LEVEL SIGNAL

VERTICAL OSCILLATOR

THIS IS A SQUARE WAVE OSCILLATOR,WORKING AT A FREE RUNNING FREQUENCY OF 47Hz AND A Toff TIME OF 300USEC.
THIS OSCILLATOR CAN BE SYNCRONISED IN A RANGE OF FREQUENCY FROM 50 TO 160 Hz(THE OUTPUT ON PIN 7 U2 IS AVAILABLE AS V-PULSE).
OUTPUT LOW LEVEL 0 VOLT- OUTPUT HIGH LEVEL 10VOLT.

SAWTOOTH GENERATOR

THIS CIRCUIT IS A SAWTOOTH GENERATOR AT VERTICAL FREQUENCY AND AN AVERAGE VALUE OF 0 VOLT.THE MAIN CHARACTERISTICS OF THIS SIGNAL IS THAT THE PEAK TO PEAK VALUE IS CONSTANT INDIPENDENTLY OF THE FREQUENCY..
THE SIGNAL COMING OUT FROM THE PIN 8 OF U12 DRIVES AN INVERTING AMPLIFIER HAVING A NOT LINEAR FEEDBACK NETWORK.THIS CONFIGURATION PERFORMS THE SO-CALLED S-CORRECTION THAT GIVES THE SAWTOOTH A PARTICULAR S-SHAPE NECESSARY TO COMPENSATE THE FLATNESS OF THE CRT.THE AMPLITUDE CONTROL OF THE SAWTOOTH IS ACCOMPLISHED BY CHANGING A DC VOLTAGE FROM 0 TO 4V(VC9) AT THE PIN 5 OF U13.ON PIN 8 OF U11 THE SIGNAL IS ADJUSTABLE FROM 4.8 TO 7V.
ANOTHER CONTROL VC10 ALLOWS TO ADD AT THE OUTPUT SIGNAL A DC LEVEL ADJUSTABLE FROM -0,35V TO 0.35V.IN THIS WAY IT IS POSSIBLE TO SHIFT THE SAWTOOTH SIGNAL AND THEN TO SHIFT ON THE SCREEN THE WHOLE VERTICAL SCAN.

PARABOLA GENERATOR

BY DRIVING THE IC TDA4950 WITH THE SAWTOOTH SIGNAL,A PARABOLA WAVEFORM IS GENERATED WITH CONSTANT PEAK TO PEAK VALUEVERSUS VERTICAL FREQUENCY AND DEPENDING ONLY ON THE AMPLITUDE OF THE INPUT SIGNAL.
THIS PARABOLA IS THEN CLAMPED AND AFTER THAT INVERTED.
WITH THE INPUT SIGNAL SET AT THE MAXIMUM,THE PARABNOLA IS 1.6Vpp.

VERTICAL LINEARITY

THE PARABOLA SIGNAL IS FEED-THROUGH INTO A VCA(VOLTAGE CONTROLLED AMPLIFIER) WHOSE OUTPUT IS ADDED TO THE INVERTED PARABOLA SIGNAL.IN THIS WAY IT IS POSSIBLE ,BY ADJUSTING THE DC VOLTAGE VC7,TO OBTAIN AN INVERTABLE PARABOLA CLAMPED AT 0 VOLT.THIS SIGNAL IS THEN ADDED TO THE SAWTOOTH SIGNAL OUTPUT TO GET THE VERTICAL LINEARITY S-CORRECTION.THE AMOUNT OF LINEARITY CORRECTION REQUESTED DEPENDS ON THE GEOMETRICAL CHARACTERISTICS OF THE CRT.

EAST-WEST AND TRAPEZIUM CORRECTION

THE INVERTED PARABOLA IS APPLIED TO THE INPUT OF A VCA AND CONTROLLED BY THE DC VOLTAGE VC6.
THE SAWTOOTH SIGNAL IS APPLIED TO THE INPUT OF A VCA AND THEN ADDED TO THE INVERTED SAWTOOTH.THE RESULTING SIGNAL IS AN INVERTABLE SAWTOOTH CONTROLLED BY THE DC VOLTAGE VC5.THE AMOUNT OF THIS CORRECTION MUST DEPEND ALSO ON THE VERTICAL DC SHIFT CONTROLLED BY THE DC VOLTAGE VC10 IN ORDER TO KEEP CONSTANT THIS CORRECTION VERSUS THE VERTICAL POSITION OF THE IMAGE.
THE TWO SIGNALS ARE ADDED TO THE DC VOLTAGES VC14 AND VC15 THAT CONTROL THE HORIZ. WIDTH.

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VERTICAL DYNAMIC CONVERGENCE

THE PARABOLA SIGNAL IS APPLIED TO A VCA AND THE OUTPUT ADDED TO THE INVERTED PARABOLA.THE RESULTING SIGNAL IS AN INVERTABLE PARABOLA CONTROLLED BY THE DC VOLTAGE VC1.THIS OPERATION IS
REPEATED USING ANOTHER VCA CONTROLLED BY THE DC VOLTAGE VC2.THE TWO SIGNAL SO OBTAINED ARE APPLIED TO TWO TRANSMISSION GATES ENABLED BY A SIGNAL COMING FROM A ZERO CROSSING DETECTOR DRIVEN BY THE VERTICAL SAWTOOTH.IN THIS WAY IT IS POSSIBLE TO OBTAIN TWO ADJUSTABLE AND INVERTABLE PARABOLA SIGNALS.ONE FOR THE FIRST HALF VERTICAL SCAN AND THE OTHER ONE FOR THE SECOND HALF VERTICAL SCAN.
ANOTHER CONTROL VC3 ALLOWS TO INTRODUCE A DC LEVEL ON THE OUTPUT SIGNAL.TO CONTROL THE MIDDLE PART OF THE VERTICAL CONVERGENCE.THE LOAD OF THIS CIRCUIT IS A COIL MOUNTED AROUND THE NECK OF THE CRT.(NECK TWIST COIL).

VERTICAL DYNAMIC FOCUS

THE INVERTED PARABOLA SIGNAL IS AMPLIFIED TO OBTAIN A SWING OF 10Vpp TO DRIVE THE VERTICAL DYN. FOCUS CIRCUIT.

HORIZONTAL PHASE CONTROL

WITH THE DC CONTROL VOLTAGE VC13 A DC VOLTAGE ADJUSTABLE FROM 2 TO 9V IS OBTAINED TO DRIVE THE PHASE MODULATOR CIRCUIT OF THE HORIZONTAL STAGE.

HORIZONTAL LINEARITY

A DC VOLTAGE VC11 ALLOWS TO CONTROL THE DC CURRENT FLOWING THROUGH THE WINDINGS CONTROL OF THE LINEARITY COIL(THIS WINDINGS REPLACE THE PERMANENT MAGNET NORMALLY USED ON THE LINEARITY COIL).

E/W BALANCE,PARALLELOGRAM AND HORIZ.SHIFT CONTROL

AN INVERTABLE PARABOLA SIGNAL,CONTROLLED BY THE DC VOLTAGE VC16 AND AN INVERTABLE SAWTOOTH SIGNAL,CONTROLLED BY THE DC VOLTAGE VC4,ARE ADDED TOGHETER TO A DC VOLTAGE VC8.THE RESULTING SIGNAL DRIVES AN ACTIVE HORIZ. SHIFT CIRCUIT IN ORDER TO PERFORM THE FUNCTION OF E/W BALANCE,PARALLELOGRAM AND SHIFT.

PULSE WIDTH MODULATOR CIRCUIT

THE SIGNAL COMING FROM THE PIN 1 U13 (HORIZ.AMPLITUDE,EAST/WEST AND KEYSTONE SIGNAL),IS COMPARED WITH A RAMP SIGNAL AT HORIZONTAL FREQUENCY,GENERATED BY CHARGING THE CAPACITOR C1 WITH A CONSTANT CURRENT.THE OUTPUT OF THE COMPARATOR (RD SIGNAL) IS A SQUARE WAVE HAVING A DUTY CYCLE MODULATED BY THE SIGNAL PRESENT ON PIN 1 U13.THIS SIGNAL DRIVES THE CHOPPER CIRCUIT POWERING THE HORIZONTAL POWER STAGE.

HORIZONTAL POWER STAGE DRIVER

THE SIGNAL COMING FROM THE HORIZONTAL OSCILLATOR H-DRIVE IS APPLIED TO TWO MONOSTABLE CIRCUIT, TO GET A SQUARE WAVE SIGNAL HAVING A Toff TIME OF 4 usec AND AFTER THAT BUFFERED IN ORDER TO DRIVE THE HORIZONTAL POWER STAGE.(HO OUTPUT)

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DIGITAL TO ANALOG CONVERTER

THESE CIRCUITS GIVE ALL THE DC VOLTAGE NECESSARY TO DRIVE THE CIRCUITS JUST DESCRIPTED.
VC1=UPPER SIDE VERTICAL DYN.CONVERGENCE
VC2=BOTTOM SIDE VERTICAL DYN. CONVERGENCE
VC3=MIDDLE SIDE VERTICAL DYN. CONVERGENCE
VC4=PARALLELOGRAM CORRECTION
VC5=TRAPEZIUM CORRECTION
VC6=EAST/WEST CORRECTION
VC7=VERTICAL LINEARITY S-CORRECTION
VC8=HORIZ.DC SHIFT
VC9=VERTICAL HEIGHT
VC10=VERTICAL SHIFT
VC11=HORIZ.LINEARITY
VC12=BRIGHTNESS
VC13=HORIZ.PHASE
VC14=HORIZ.WIDTH
VC15=HORIZ.WIDTH
VC16=EAST/WEST BALANCE
VC17=SUB-BRIGHTNESS
VC18=HORIZ.CONVERGENCE

ALL THESE DC VOLTAGE CAN CHANGE FROM 0 TO 4V IN RELATION TO THE LOGIC DATOUT1 CONTENT.

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After measuring the frequency of the incoming sync signal . the microprocessor is able to send to the oscillator circuit the actual division rate as follows :

Division Rate (F in) = VCO freq. / F in

The division rate updating is done only when the system goes from the locked to the out-of-lock status (signal OL at pin 4 of HEF 4750 is high) , in order to avoid instability of the circuit .

Sync processor circuit

The sync processor circuit perform the following functions :
a) sync polarity detection
b) sync polarity unification
c) sync level buffering
d) combined sync separation
e) video DC restoration pulses generation

The detection of polarity of the incoming H & V syncs is done in order to give to the Logic board an additional sensing on the actual video timing ; for example , this is required for the recognition of the VGA modes which have same horizontal & vertical frequency but different sync polarities . The detection signals , POL-HOR and POL-VER , are available at output pins 6 & 11 of U 222 (open collector Nand gate) .

The aim of the sync polarity unification circuit is to drive the horizontal and vertical oscillators always with positive sync pulses regardless of the incoming syncs polarity ; this function is accomplished by Exclusive OR gates (U 225) .

After passing the XOR gates . sync amplitude is still TTL level ; since the CMOS technology of the horizontal oscillator system requires +10V signals swing , both H & V sync are buffered (and inverted) by transistors V 227 and V 228 .

The separation of the vertical sync in case of combined input signal is made by U 226 (1/2) and U 227 (1/2) .

Second section of monostable I.C. U 226 generates a 0,5μS duration pulses (CLAMP signal) triggered on the falling edge of the incoming horizontal sync ; this signal is sent to the video amplifiers and allows the DC restoration during the back porch period .

The other section of D-flip flop I.C. (U 227) is used to trigger the strobe pulses (ST) which enables the updating of the S-correction caps status with the horizontal retrace pulses (HFL) ; this is required in order to reduce the power dissipation of the power MOS switches during the insertion of the S-capacitors .

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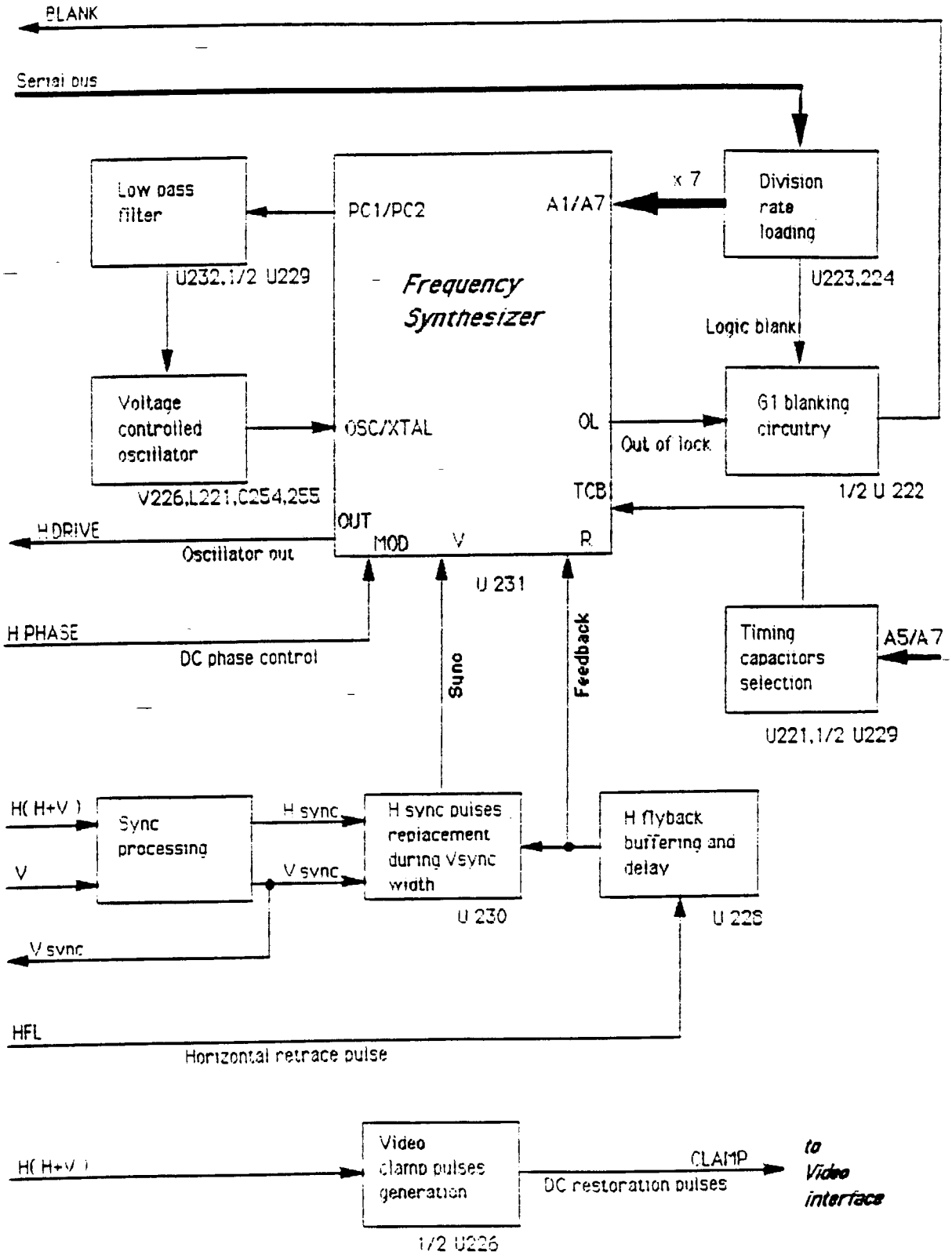
C 2082 DAS block diagrams : Horizontal Synchr. board



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Horizontal Synchronization board

The Hor. Synchr. board mainly consists of a sync processing circuit and of a complex horizontal oscillator system .

The horizontal oscillator is built around the frequency synthesizer U 231 (HEF 4750) . The I.C. contains an oscillator section . a programmable divider and two sophisticated phase comparators which are able to eliminate any phase jitter , intrinsic or due to some external noise.

The oscillator section (pin 21 X-tal , pin 22 osc) is provided with an external L-C resonant circuit tuned at 6 Mhz made by L 221 and C 254.255 ..In order to create an appropriate catching range for the overall PLL this oscillator is voltage controlled by the varicap diode (V 253). Its capacitance is varied by the output of the active low-pass filter (U 232 , supplied at +24V) in order to get a wide oscillation frequency range from 5.7 to 6.3 Mhz.

When still out of lock , a digital phase comparator (pin 9) provides a wide and fast capture . Once locked , pin 9 becomes floating and the analog phase comparator output (pin 8) becomes dominating . Due to the high speed of the analog phase comparator , the operation with combined sync (with this standard the horizontal pulses are missing during the vertical sync width) can lead to a synchronization problem .visible during the first lines of the vertical scan : to avoid this problem the missing H pulses are replaced by the H retrace pulses (U 230) and the outputs of the P.C.s are disabled by means of two analog switches (1/2 of U 229) .

In steady state condition. a fixed time difference is maintained between the negative going transitions of the incoming sync signal and the flyback signal coming from the line output stage (HFL) , clamped at 10 V by an emitter follower circuit and inverted by one section of the comparator U 228 .

Timing capacitor C 231 and slicing level MOD (pin 27) yield this difference . Some horizontal phase adjust is accomplished by setting level MOD with H PHASE digital control ..

During the operation at low line frequencies (i.e. VGA) , additional timing capacitors C 232 , 226 are connected in parallel to the fixed one by using two analog switches (1/2 of U 229) , in order to increase the phase adjustment range .

The pins of the programmable divider section (pins 11 = LSB. 12.13. 15.16.17.18 = MSB) are controlled by the Logic Board , after a serial to parallel conversion performed by U 223 and a level shift (U 224) .

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The firmware is stored into the Eprom memory U 709 ; the I.C. contains also some operating data related to the incoming horizontal frequency , such as the PLL division rate table , the horizontal linearity control table and the S-correction capacitors insertion table . At every power - on , the current firmware release is displayed on the front LCD .

All the monitor set-up (geometry adj. , video adj. , factory preset timings) is stored into I.C. U 707 (EEprom) ; this is also the memory area dedicated to receive the new settings stored by the user (image centering & position , Bright. & Contrast settings , H & V convergence settings , input selection , Color temp selection , new video timings) .

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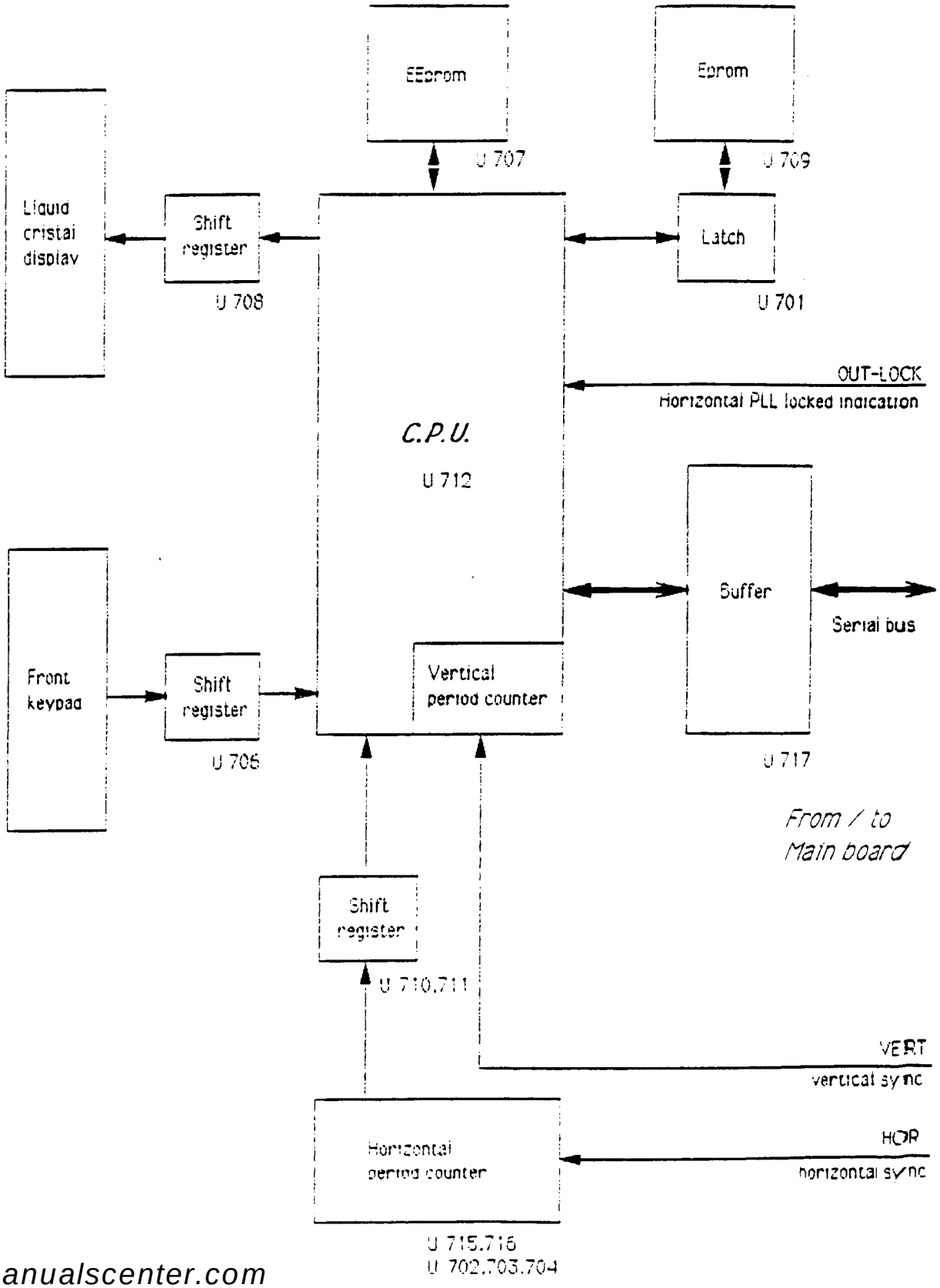
C 2082 Digital Auto Scan block diagrams : Logic board



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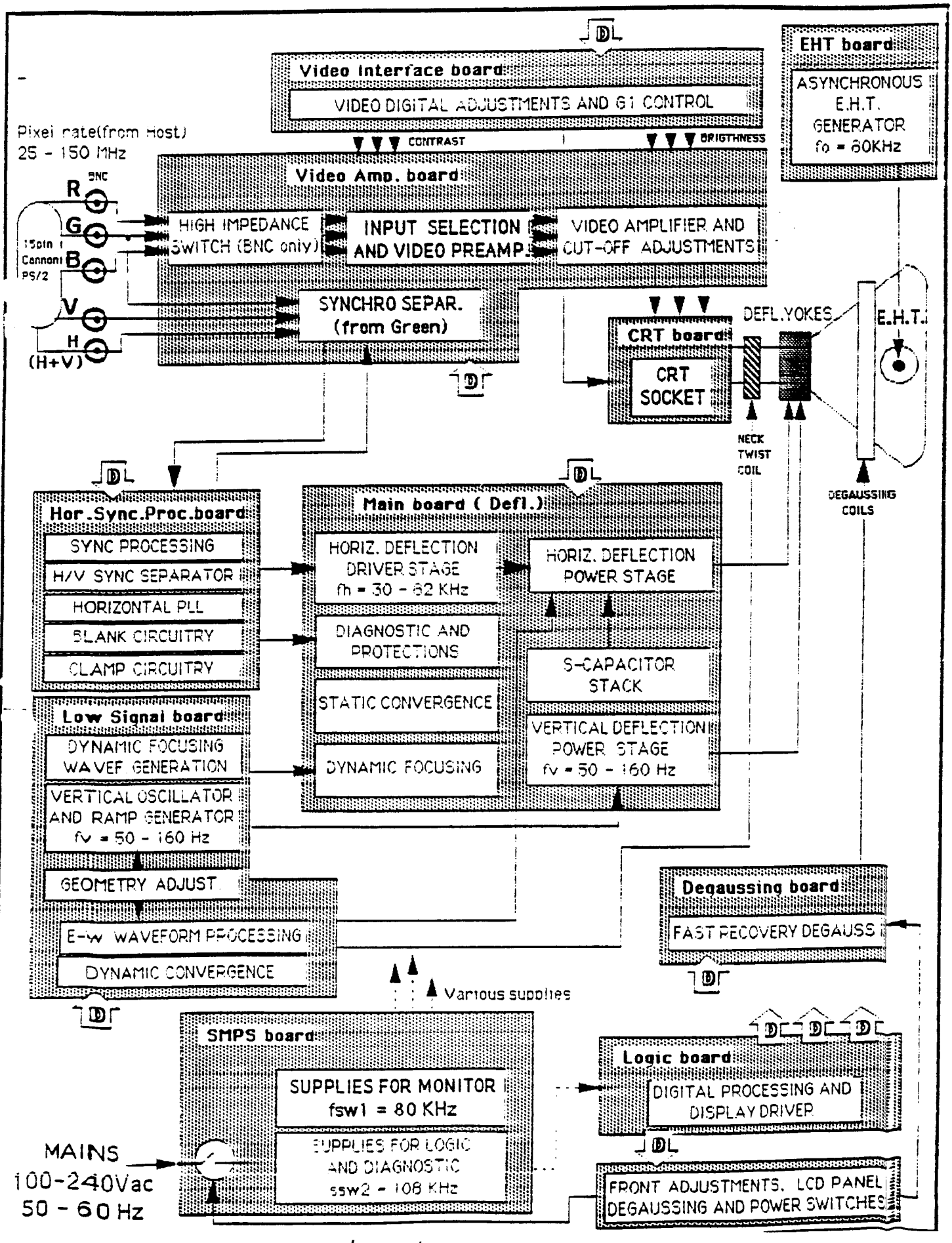
AS TRINITRON COLOR MONITOR BLOCK DIAGRAM



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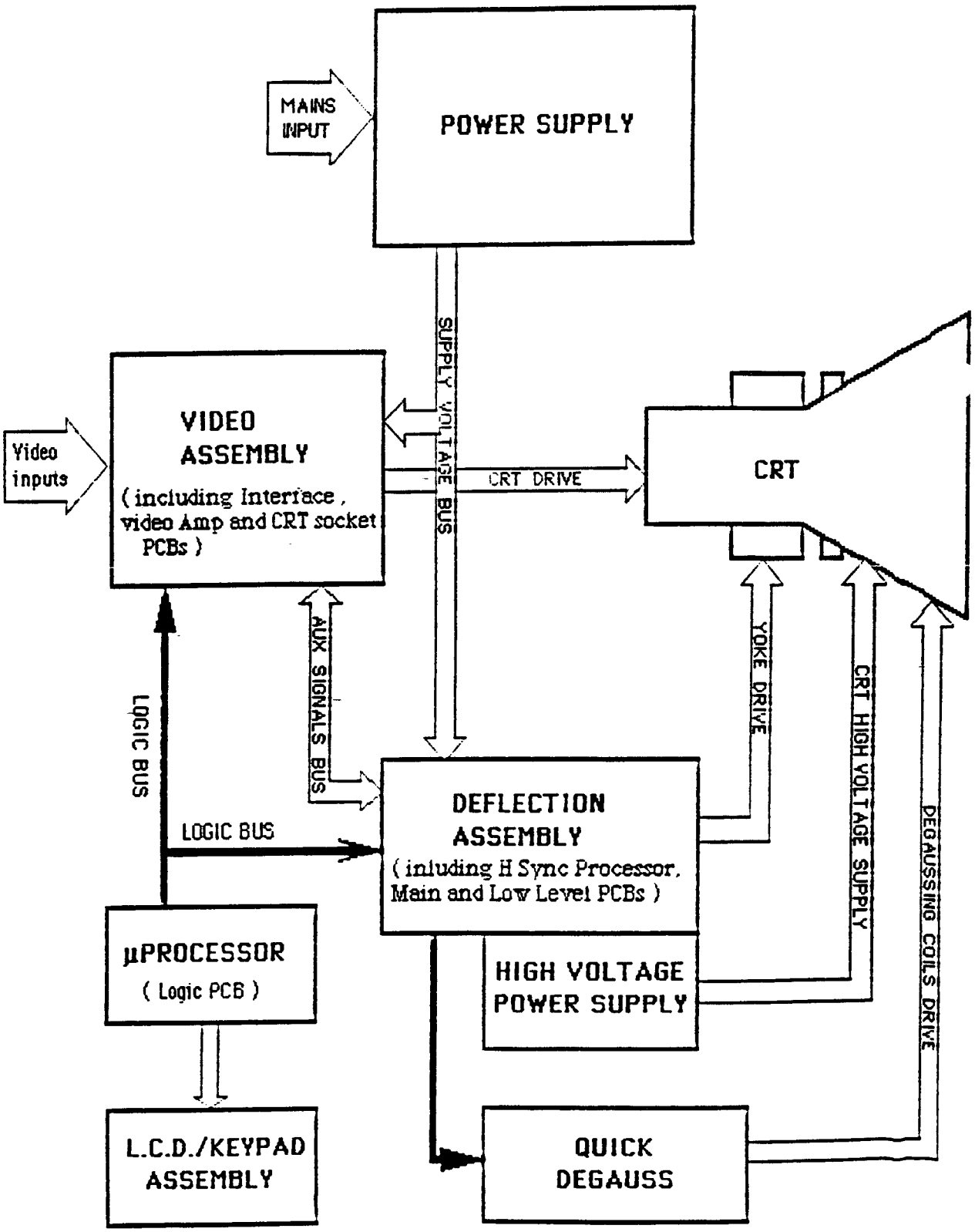
C 2082 Das : Digital auto scan

BLOCK DIAGRAM



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PRODUCT DESCRIPTION

The ***Mars 9320 T*** is a 20" high resolution digitally controlled autoscan color monitor,specifically designed for high end graphics applications.
The monitor will synchronize itself automatically in a wide range of scanning frequencies (30 to 82 khz horizontal and 50 to 160 hz vertical) and will discriminate the specific operating mode.
A memory has the capability of storing the display geometric parameters of each operating mode up to 22 modes (14 are factory preset) .
A display will indicate the memory channel related to the specific mode under operation ; if the mode has not been previously stored , the user has the possibility to adjust the geometry parameters of the display and to store them into the desired memory channel (the first free channel will be addressed as default).
The recognition of the operating mode is done by sensing the scanning frequencies (horizontal & vertical) and the polarity of the input sync signals . If the specific mode is already stored in the memory , the monitor will adjust itself (picture size & centering) automatically . The user has the possibility to change the stored adjustment , even if related to factory preset modes ; he has also the possibility to recall a factory preset adjustment by means of a memory recall function .

TECHNICAL DATA

GENERAL

Mains voltage : 90 to 132 and 180 to 264 Vac range , automatic selection
Mains frequency : 47 - 63 Hz
Power consumption : 180W max.
Operating temperature : 5 to +40 C

CATHODE RAY TUBE

Size : 20" (19 visual) aperture grille type (Trinitron)
Stripe pitch : 0.30 mm
Antireflection : HEA panel
Light transmission : 39%
Anode voltage : 27.5 kV

SCANNING FREQUENCIES

Horizontal : from 30 to 82 kHz , continous range
Vertical : from 50 to 160 Hz , continous range
Sync signals : separate or combined at TTL level , combined on GREEN video , automatic selection.
Separate sync polarity : positive or negative
Video bandwidth : up to 150 MHZ

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Logic board

The circuits located on the Logic board can be identified as three functional blocks :

A) Horizontal period meter

B) C.P.U. logic , that includes memory , C.P.U. , synchronous serial interface from/to peripherals circuits (DACs , I/O)

C) User & service interface , that includes LCD drive , Keyboard drive , asynchronous serial interface (ext. RS-232)

The horizontal period meter works with a 42 nS timebase (24 MHz quartz oscillator) , triggered on the trailing edge of the incoming sync (HOR signal) . The CPU can read the measured data by means of two shift registers (U 710,711) . U 714 (D-type flip flop) is used to detect the presence of the horizontal sync , for diagnostic purposes ; it is triggered by the trailing edge of the H sync and reset by the CPU (after the reading) at the system refresh frequency , that is nearly 100 Hz .

The period of the incoming vertical sync is measured by the CPU itself with an internal timebase of 1 µS resolution .

The measured horizontal & vertical periods are acquired by the CPU with a dynamic average algorithm ; in addition , the horizontal data is digitally filtered in order to avoid jitter when working with combined sync.

The CPU logic , working on the main program , performs the following functions :

- start up program and diagnostic self-test at power on

- incoming timing check based on H & V period meter readings and sync polarities

- geometry parameters updating in case of known (already stored in the memory) timing ; the resolution of the memory channel is :

1 Hz for vertical frequency
50 Hz (at 30 kHz) / 500 Hz (at 82 kHz) for H frequency

- diagnostic check based on H & V deflection , High Voltage , horizontal PLL , syncs , operating frequency range

- keyboard control for user operation (Contrast , Bright. , geometry , convergence , color temp.) and memory store/recall functions

- external serial interface control for automatic factory alignment or service purposes

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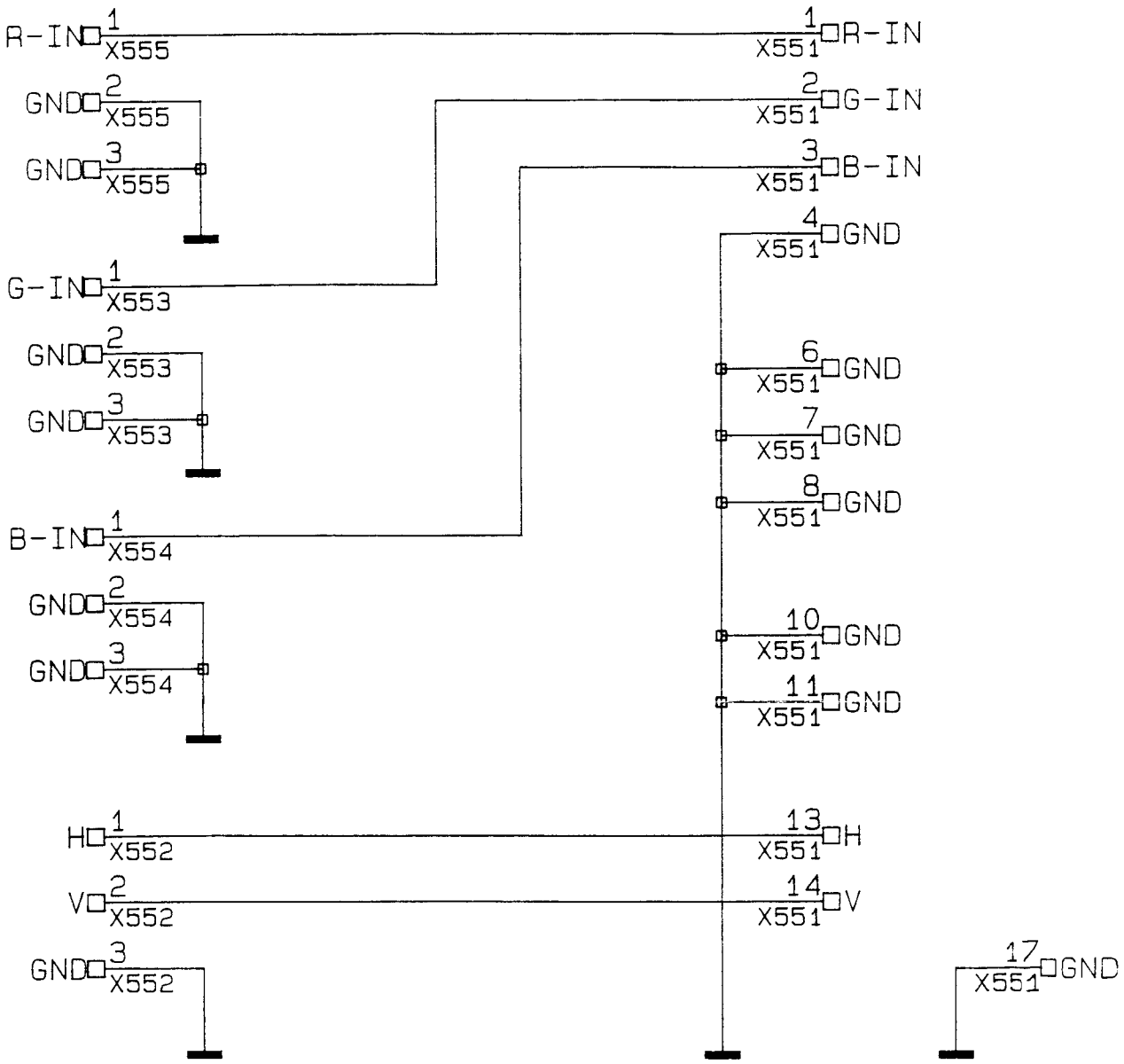

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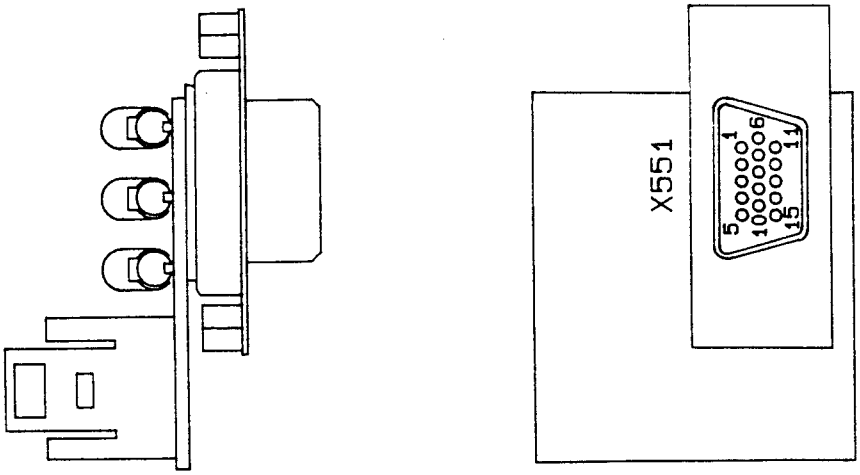
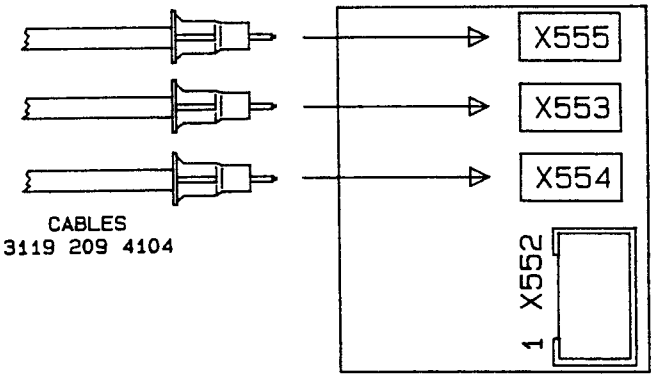


COMPONENTS SIDE VIEW
VISTA LATO COMPONENTI



SOLDERS SIDE VIEW
VISTA LATO SALDATURE

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VENDOR SHALL CERTIFY COMPLIANCE WITH THE ENVIRONMENTAL REQUIREMENTS ACC. TO UAN-D 1783

CLASS NO.						
203 3573		CONN PCB DAS	3119 208 6248		1	-
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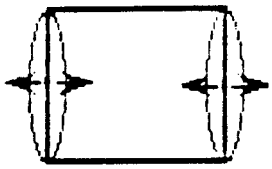
TUTTI I DIRITTI SONO STRETTAMENTE RISERVATI. LA

If there are points exceeding the specification limit , the monitor needs readjustment. Looking at the type of distortion you are facing in , you should be able to decide which specific control needs to be readjusted , according to the given commands list .

**WARNING : in case of picture tube replacement , since there are no electronic controls of the picture "tilt" , good performances of this parameter can only be achieved paying attention of the alignment between the CRT and the metal frame during mechanical mounting .

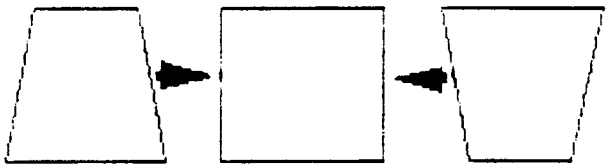
Side pincushion distortion adjustment

Adjust HOR.PINCUSHION ADJ digital control so that both right and left sides of the picture become linear .

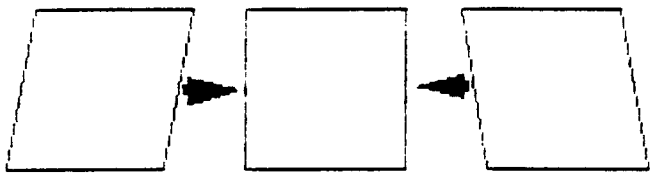


PINCUSHION ADJ Movement

Adjust HOR.KEYSTONE ADJ and HOR.KEYSTONE BAL until the upper and lower sections of the picture become of the same width .



Movement of KEYSTONE ADJ control



Movement of KEYSTONE BAL control

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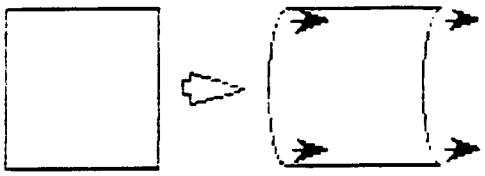
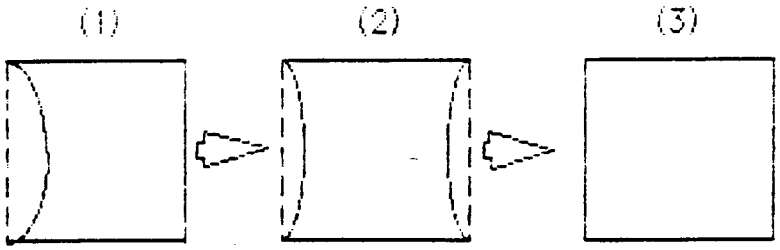
At this point , check again the pincushion distortion at both left and right sides of the picture : if one side is over/under corrected while the other side is linear , act on HOR. PINCUSHION BAL until the amount of distortion is the same at both sides and then adjust again HOR.PINCUSHION ADJ in order to make them linear.



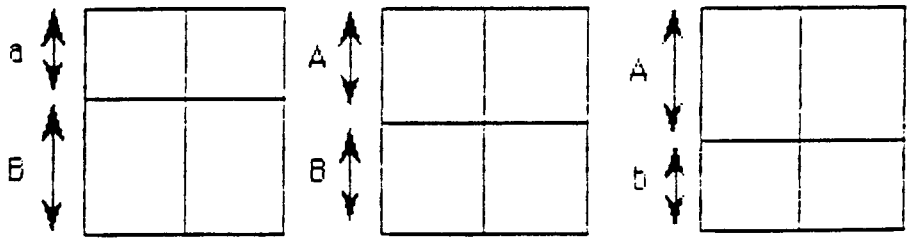
PINCUSHION BAL Movement



(1) When right and left pincushion distorsion is not equal.
(2) Adjust PIN BAL for symmetry.
(3) Adjust PIN ADJ to linearize.

Vertical linearity

Adjust VERT.LINEARITY ADJ. until top and bottom halves of the picture are same height .



V - LIN movement

Horizontal linearity

**WARNING . horizontal linearity adjustment value is already factory defined for the best performances over the operating frequency range and it cannot be modified. The HOR.LINEARITY ADJ. digital control which appears in the list of available commands is intended to be used as functional check of the horizontal linearity electronic circuit , driven directly by the Logic µP according to the actual horizontal frequency .

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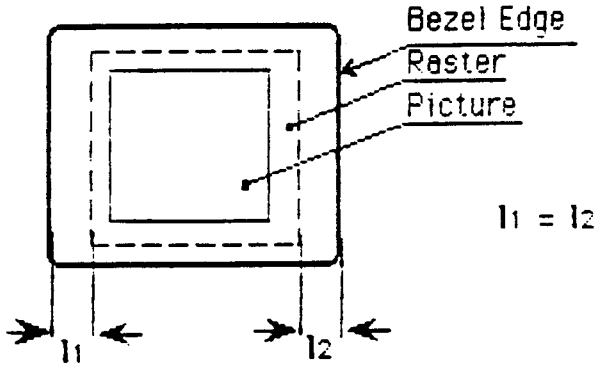
Horizontal raster centering check and alignment

**WARNING : perform this step only in case of picture tube replacement .

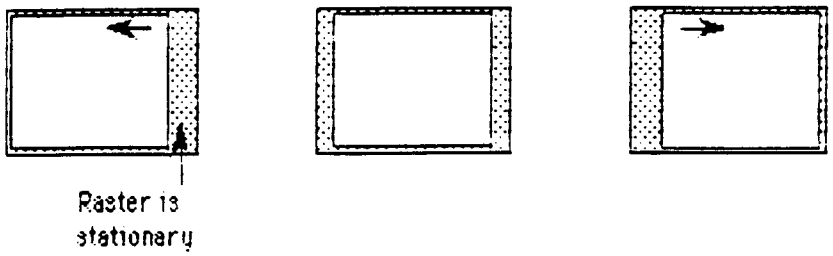
Adjust HOR.SHIFT ADJ digital control in order to center the raster area (not the video area) respect to the plastic bezel : if necessary , reduce the horizontal size so that the limit of the raster is visible .



Centering standard

**Note :

if the raster luminance is too low , you should leave the GEOMETRY menu and enter the NO VIDEO menu ; then set BRIGHTNESS digital control to max and , if necessary , adjust also BRIGHTNESS PRESET digital control until the raster area becames bright enough (in this case , at the end of the raster centering procedure , the brightness preset control must be set again to the original value)



Movement of H. PHASE control

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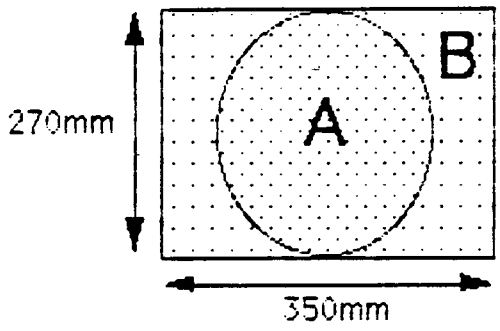
Convergence check and adjustment (Trinitron model only)

- Misconvergence error is defined as the deviation of the Red and Blue beams with respect to the Green beam , when the Red , Green and Blue beam are precisely aligned (zero misconvergence error) you will see only a thin white line .
The 20"DAS monitor allows the operator to adjust the misconvergence error in both vertical and horizontal direction , by means of digital controls .
All the controls described below will move only the Red and Blue beams , while the Green beam is stationary .

**WARNING : do not try to adjust the additional analog convergence controls located on the D.Y. ; they are already preset at factory for the best convergence performances .
In case of picture tube replacement , if necessary , act on those controls as described in appendix A .

To start the monitor misconvergence-check , select CROSSHATCH pattern from the DASFIMI test software main menu ; a suitable pattern and a list of the available commands will be displayed .
At this moment , by using a convergence gauge , check the monitor misconvergence error according to the following limits :



zone A limit : 0.3 mm max , horizontal & vertical
zone B limit : 0.4 mm max , horizontal & vertical

If there are points exceeding the specification limits , you should be able to decide which specific control needs to be readjusted , according to the given command list.

**IMPORTANT : It is not always possible to precisely align the convergence at every point of the screen . Rather , try to attain the best possible overall alignment with each convergence control.

Horizontal static convergence

- Adjust STAT CENTER HOR.CVG digital control until the Red , Green and Blue beam that form the **vertical** lines in the center of the crosshatch pattern are aligned as precisely as possible .

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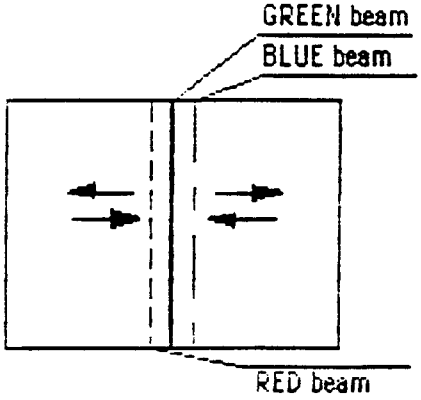
**NOTE : This digital control acts in combination with the Convergence Preset RGV potmeter (location : top of high voltage generator , Main board monitor side) : in case of picture tube or Main board replacement , perform the following procedure :

1) Set STAT CENTER HOR.CVG digital control to half scale (80 hexadecimal value)

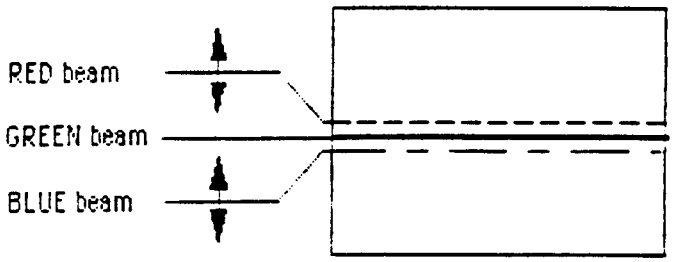
2) Adjust the Preset potmeter for the best beam alignment on the vertical lines in the center of the crosshatch pattern.



Horizontal static convrgence movement

Vertical static convergence

- Adjust STAT CENTER VERT.CVG digital control until the Red , Blue and Green beam that form the **horizontal** lines in the center of the crosshatch pattern are aligned as precisely as possible .



Vertical static convergence movement

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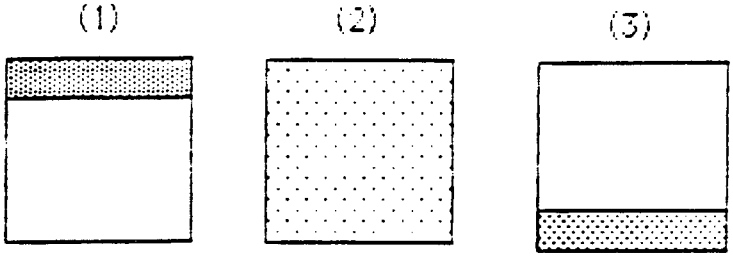
Vertical dynamic convergence

- Once the vertical static convergence has been aligned , if necessary act on DYN TOP & DYN BOTTOM VERT CVG digital controls in order to have the best beam alignment on the **horizontal** lines at the top and bottom areas of the crosshatch pattern .



(1) Dyn.top vert. cvg control adjustment area
(2) Stat.center vert.cvg control adjustment area
(3) Dyn.bottom vert.cvg control adjustment area

Video check & adjustment

- Before checking or performing any video adjustment , make sure you have performed any necessary geometric adjustment .
In case of picture tube replacement , you should perform also a preliminary focus adjustment (focus 1 & 2) and set G2 (Screen) control until the raster area becomes just visible .
The above mentioned high voltage controls are not of a digital type and they are part of the Focus Pack which is located on the top of the video shielding box .

****WARNING** : the video adjustment has to be performed only if the quality of the color is unacceptable ; use the following procedure to easily determine whether you need to perform the video adjustments :

1) make sure that current Color Temp selection is color 1

2) select GRAY BAR pattern from the DASHIMI test software main menu

3) set BRIGHTNESS digital control so that the raster area just disappears

4) set CONTRAST digital control to the maximum (FF hexadecimal value)

5) check that the following conditions are true :

- there's no predominant color in the gray bars (consider that color temp 1 hue is a slightly "blueish" white)

- the brightest (rightmost) bar measures at least 25 foot lamberts luminance.

If these conditions are not met , perform the following alignment procedure :

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A) Video level (cutoff) adjustment

**WARNING : the darker the environment where video level adjustment is performed , the better white tracking can be achieved later : be sure to perform this adjustment in as a dark place as possible .

- To start to the video level adjustment , select NO VIDEO pattern from the DASFIMI test software main menu . By making this choice , all the video informations will be switched off (except the list of available commands) in such a way that only the raster area is visible .
Then , adjust the following controls to the specified value

1) set BRIGHTNESS digital control to FF hexadecimal value

2) set BRIGHTNESS PRESET digital control to 00 hexadecimal value

3) set RED,GREEN & BLUE LEVEL digital controls to FF hex value

4) set G2 (screen) control to the minimum (counterclockwise)

Now you can proceed with the video level alignment procedure :

5) turn the screen control clockwise gradually and set to the position of which a single color (reference color , cathode with highest cutoff) appears faintly .

6) adjust the LEVEL digital controls of the colors other than the one at point 5) until they are as bright as the reference color ; at this point , there should be no predominant color in the raster area (dark gray gradation) .

7) set BRIGHTNESS PRESET digital control to FF hex value and check that the raster area is just visible (or just disappears) ; if not , readjust **slightly** G2 control .
Leave BRIGHTNESS PRESET digital control to FF hex value .

B) Video gain (white balance) adjustment

- To perform properly the white balance adjustment , a TV color analyzer calibrated with FIMI spectrometer is required .
Alignment specifications for C.I.E. color coordinates and display brightness are :

Color temp 1 (9300°K + 8 MPCD) : x = 0.283 / y = 0.298 at 30 Ftl +/-3 Ftl

Color temp 2 (6500°K + 7 MPCD) : x = 0.313 / y = 0.329 at 25 Ftl +/-3 Ftl

C.I.E. x & y color coordinates alignment tolerance is +/- 0.020 units .

- To start the adjustment , select WHITE BOX pattern from the DASFIMI test software main menu : a suitable pattern and a list of the available commands will be displayed .
Then , set the probe of the TV color analyzer to the screen center and pre-adjust the video digital controls as follows :

BRIGHTNESS control : set to max (FF hex)

CONTRAST control: set to max (FF hex)

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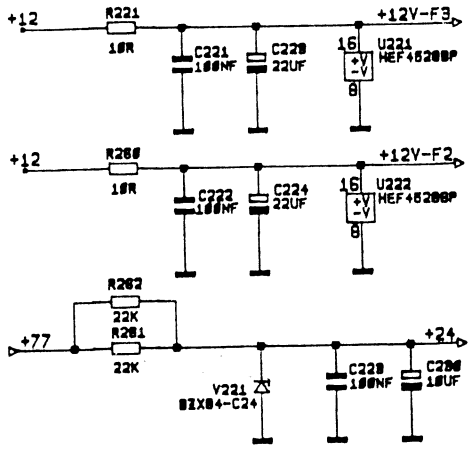

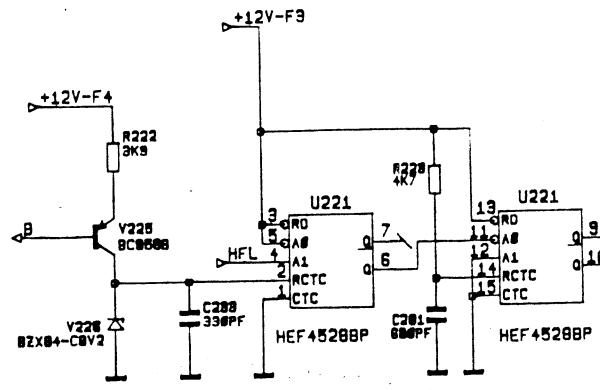

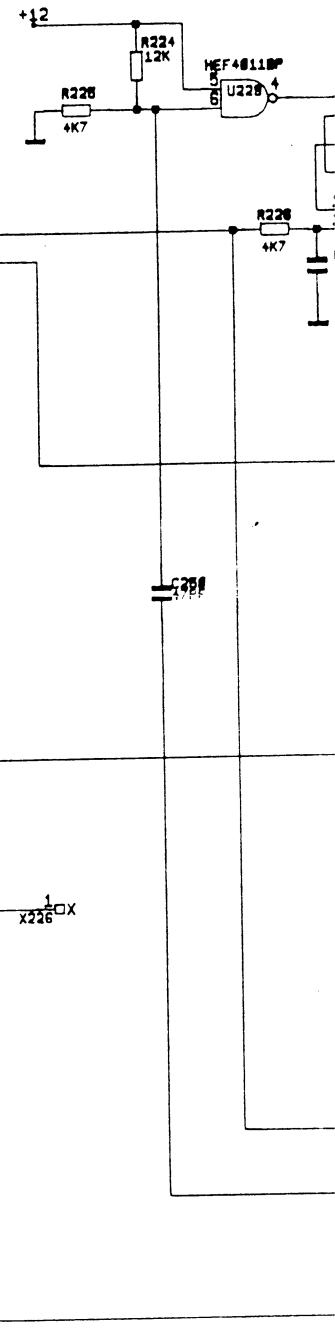

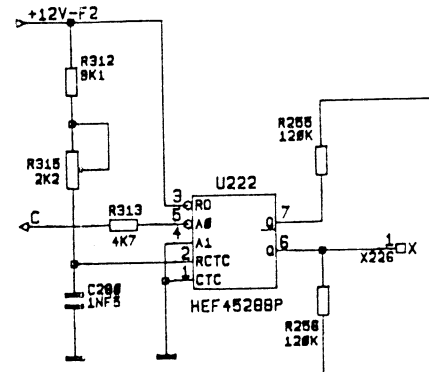

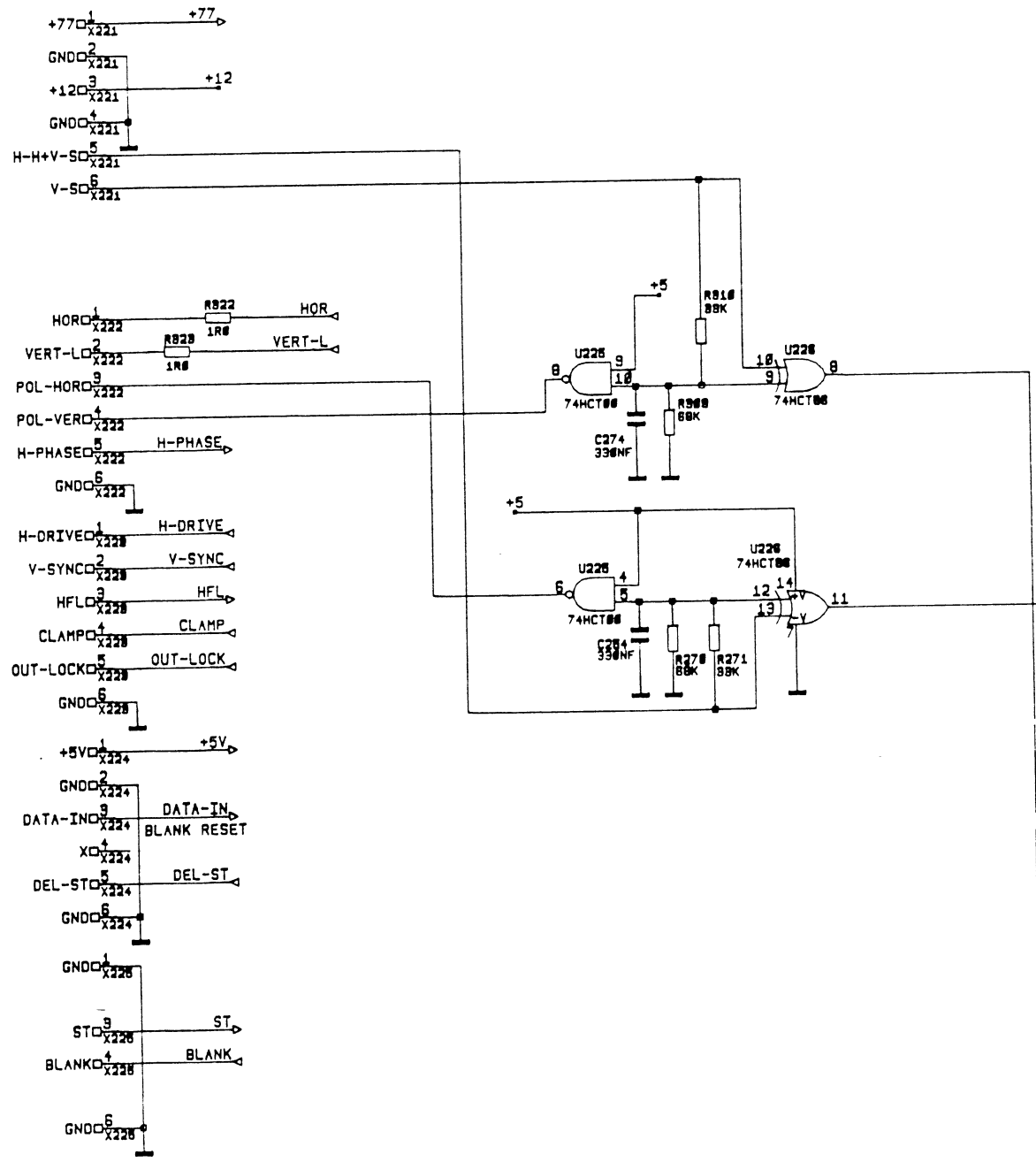

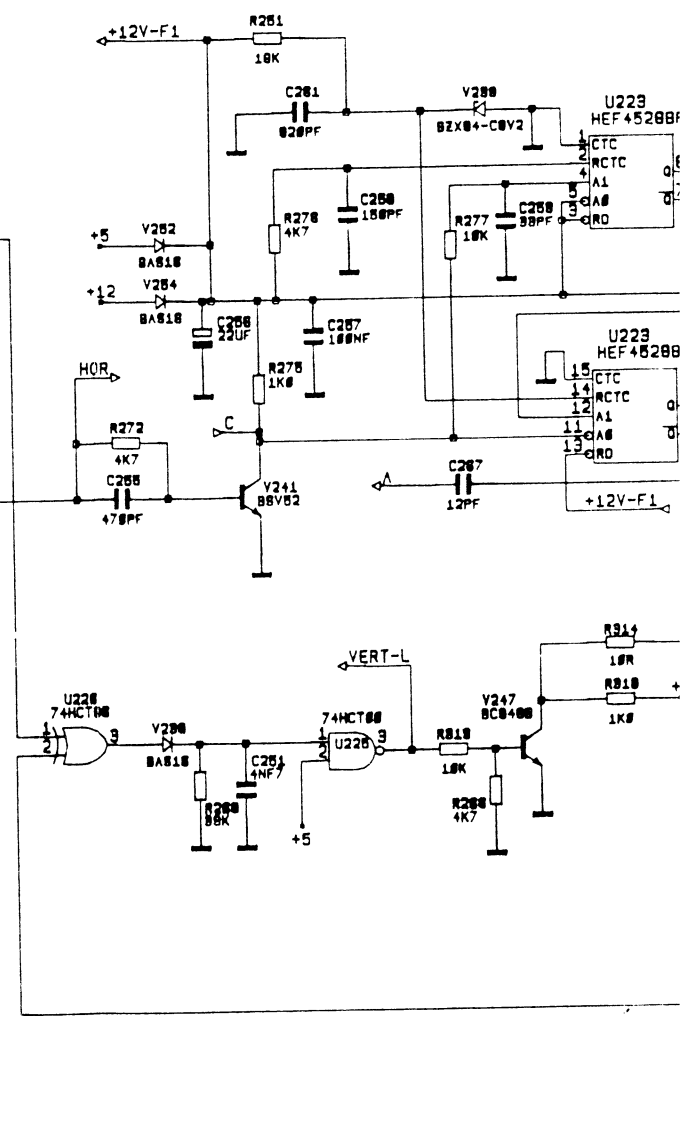

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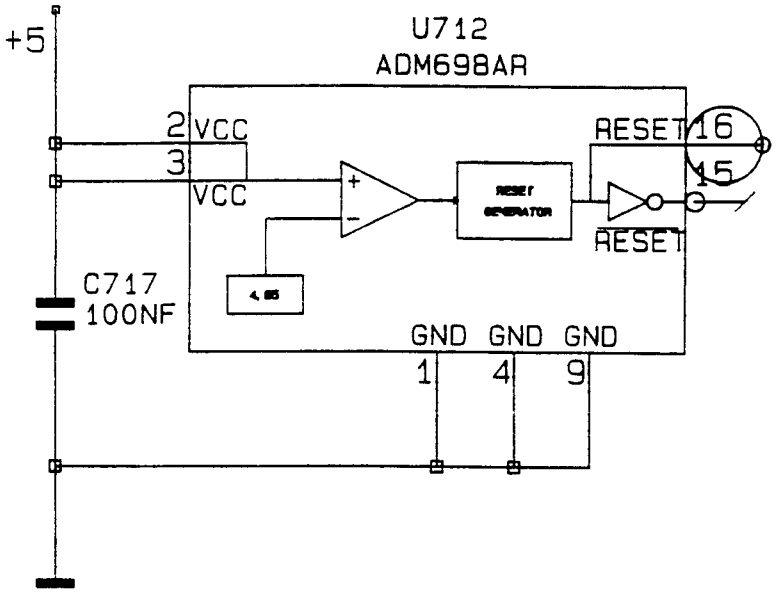

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CLASS NO. 203 3645 1 / 94-01-26 GC	SCHEMATIC LOGIC RESET GENERATOR	3119 208 6374	1 / -
NAME MAZZEO	SUPERS.	1 SH.	SH. 130 — 1
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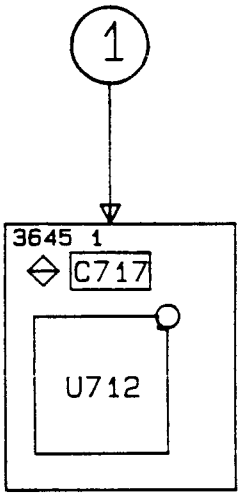

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203 3645 1			
96-01-26 GC			
NAME MAZZEO	SUPERS.	1 SH.	SH. 110 — 1
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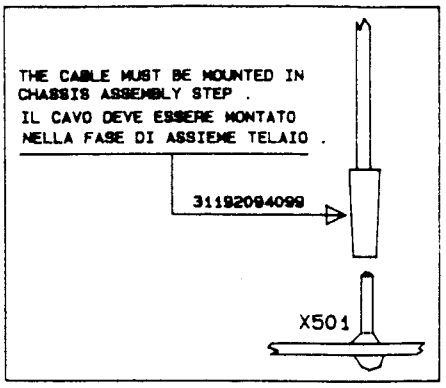
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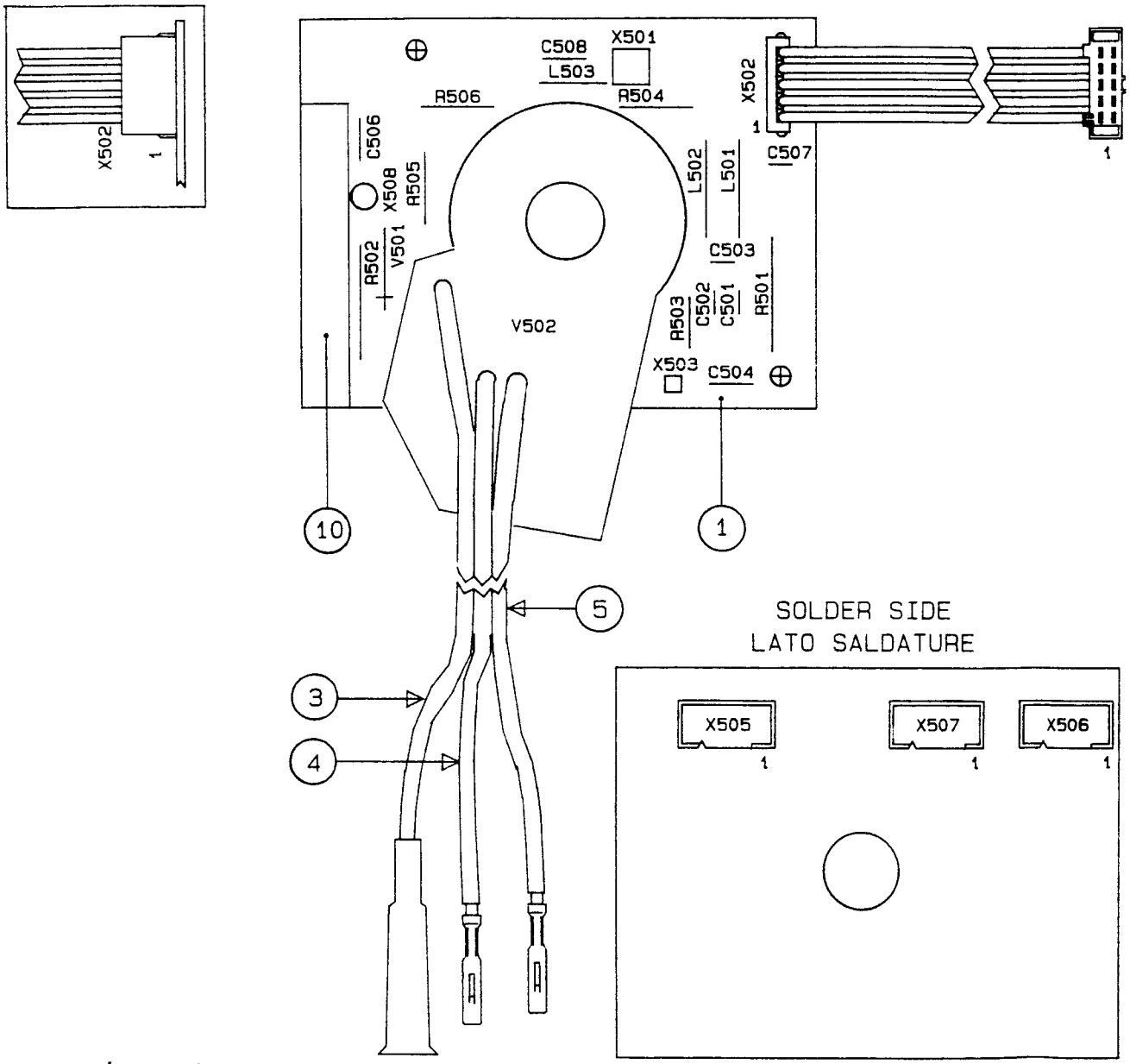
LATO COMPONENTI



SOLDER SIDE
LATO SALDATURE

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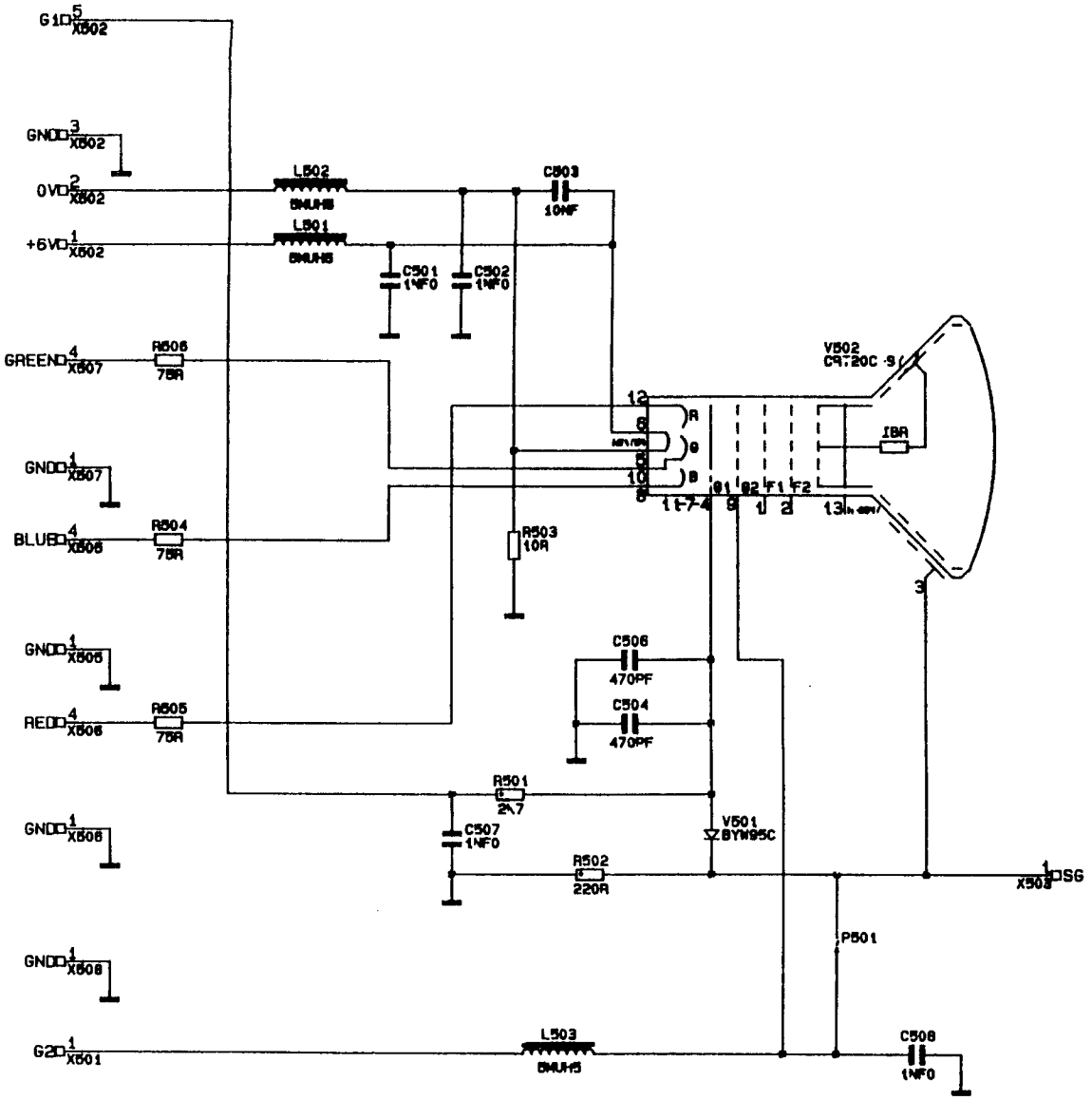
94-02-24	CG			
203 3566				
NAME GIAMPIERI		SUPERS.	1 SH.	SH. 110 — 1



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84-02-24 C9	C2082 DAS/BR-C084 C.R.T. BOARD	3119 208 6372
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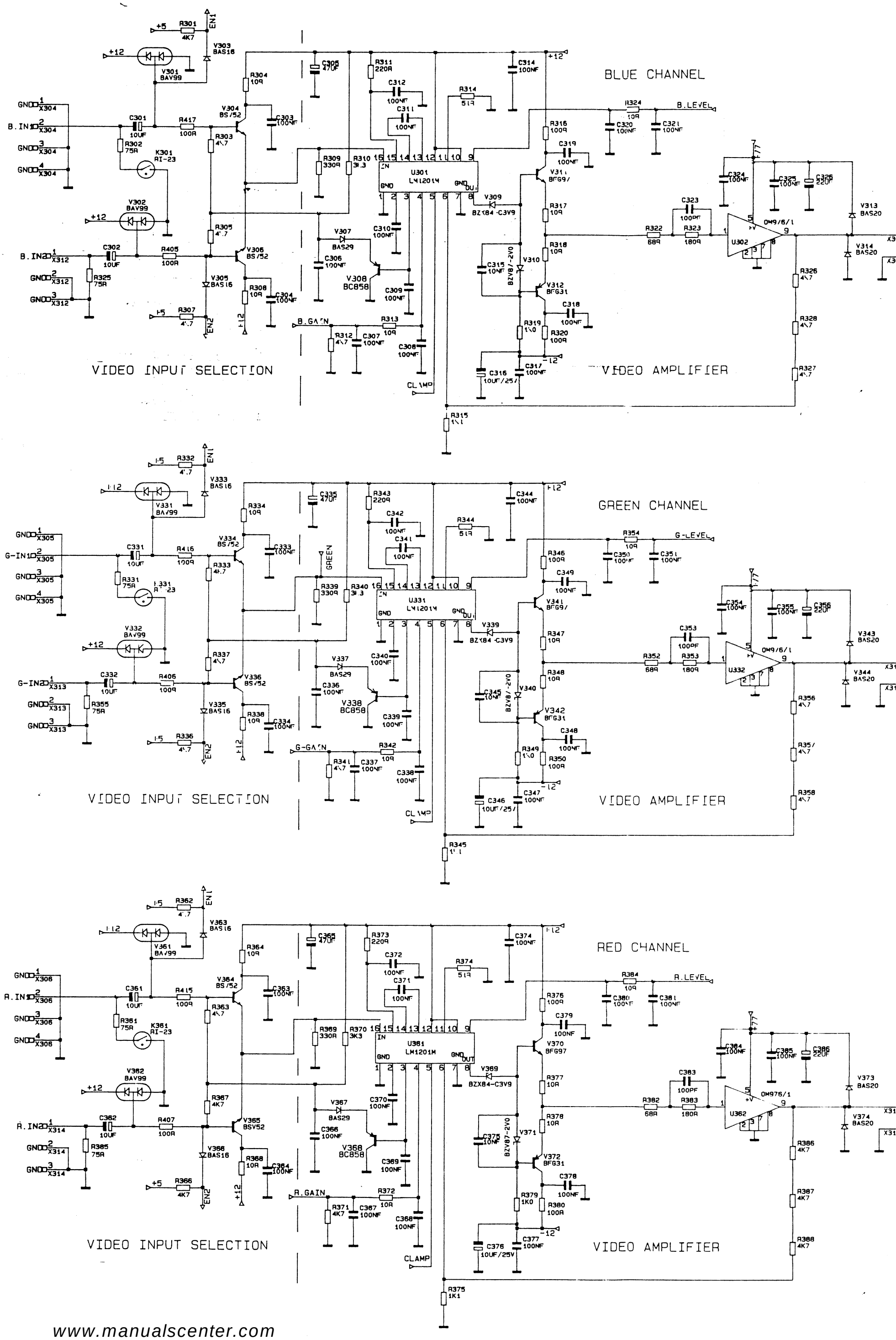
BLUE CHANNEL
VIDEO INPUT SELECTION
VIDEO AMPLIFIER
GREEN CHANNEL
VIDEO INPUT SELECTION
VIDEO AMPLIFIER
RED CHANNEL
VIDEO INPUT SELECTION
VIDEO AMPLIFIER
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B.IN2
G-IN1
G-IN2
R.IN1
R.IN2
B.LEVEL
G-LEVEL
R.LEVEL
B.GAIN
G-GAIN
R.GAIN
CLAMP
U301 LM1201M
U331 LM1201M
U361 LM1201M
U302 OM976/1
U332 OM976/1
U362 OM976/1
K301 RI-23
K331 RI-23
K361 RI-23
V301 BAV99
V302 BAV99
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V304 BS/52
V306 BS/52
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V336 BS/52
V364 BS/52
V365 BSV52
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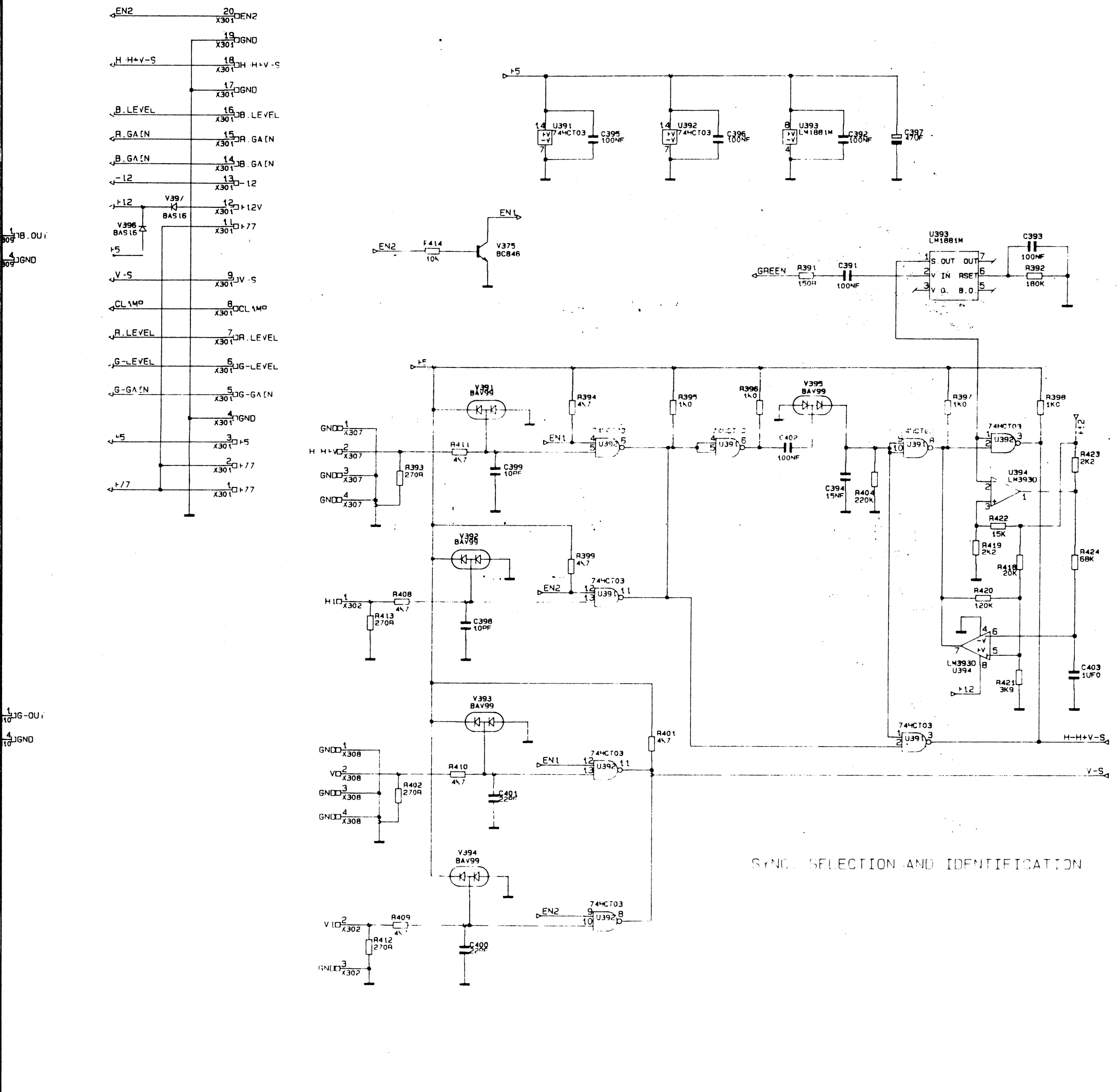

SYNC. SELECTION AND IDENTIFICATION

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94-02-04 CG	C20/2182 BRIDGE 94 PCB VIDEO AMPL.	3119 208 6367
203 3564		

SIAMPIERI — 1 SH — SH. 130 – 1

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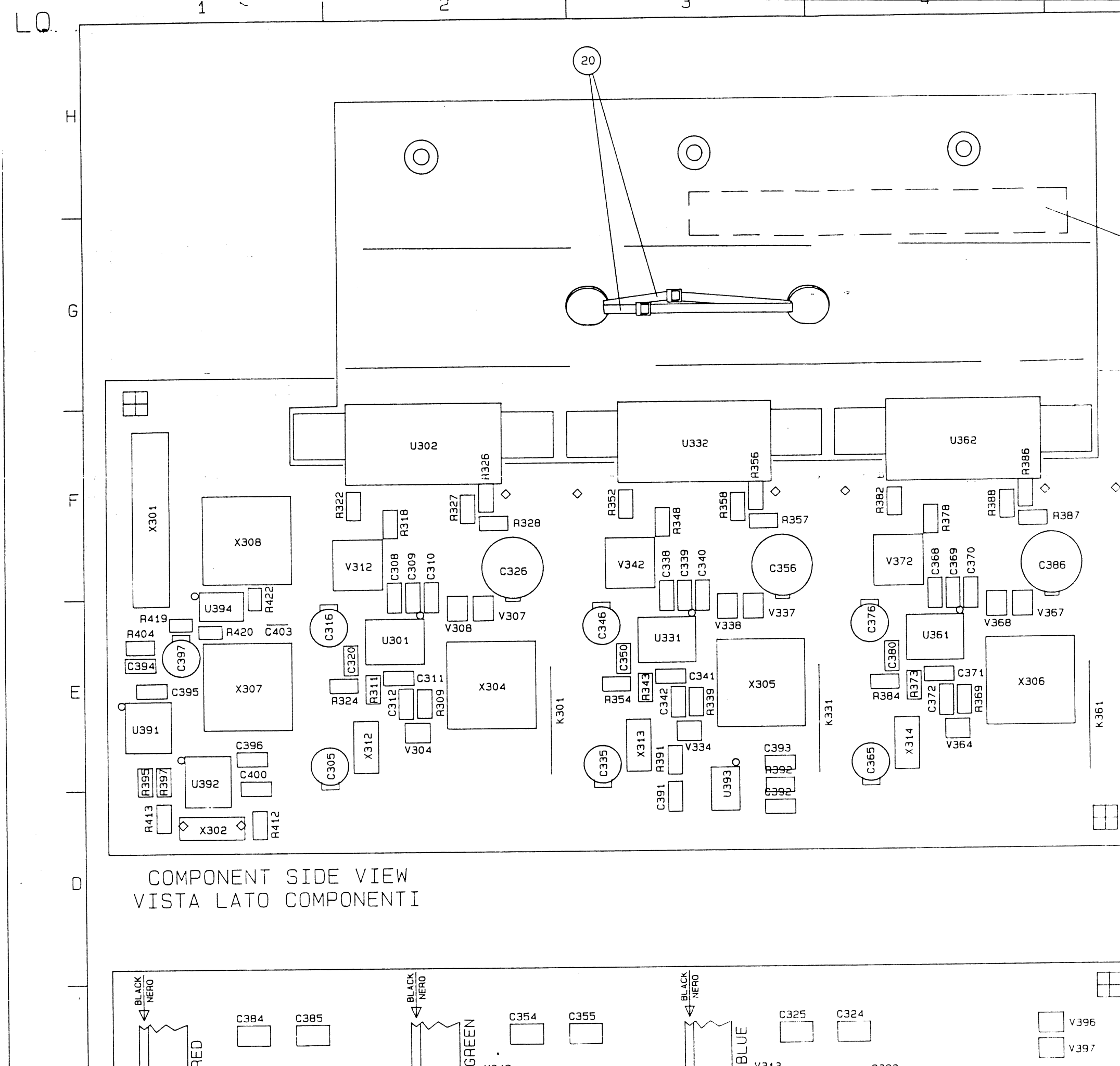

COMPONENT SIDE VIEW
VISTA LATO COMPONENTI

SOLDER SIDE VIEW
VISTA LATO SALDATURE

SOLDER PASTE MASK COMP. SIDE :
MASCH. PASTA SALD. LATO COMP.: 8219 253 3509.2 SEE : VEDI: SP01

SOLDER PASTE MASK SOLDER SIDE:
MASCH. PASTA SALD. LATO SALD.: 8219 253 3510.2 SEE : VEDI: SP02

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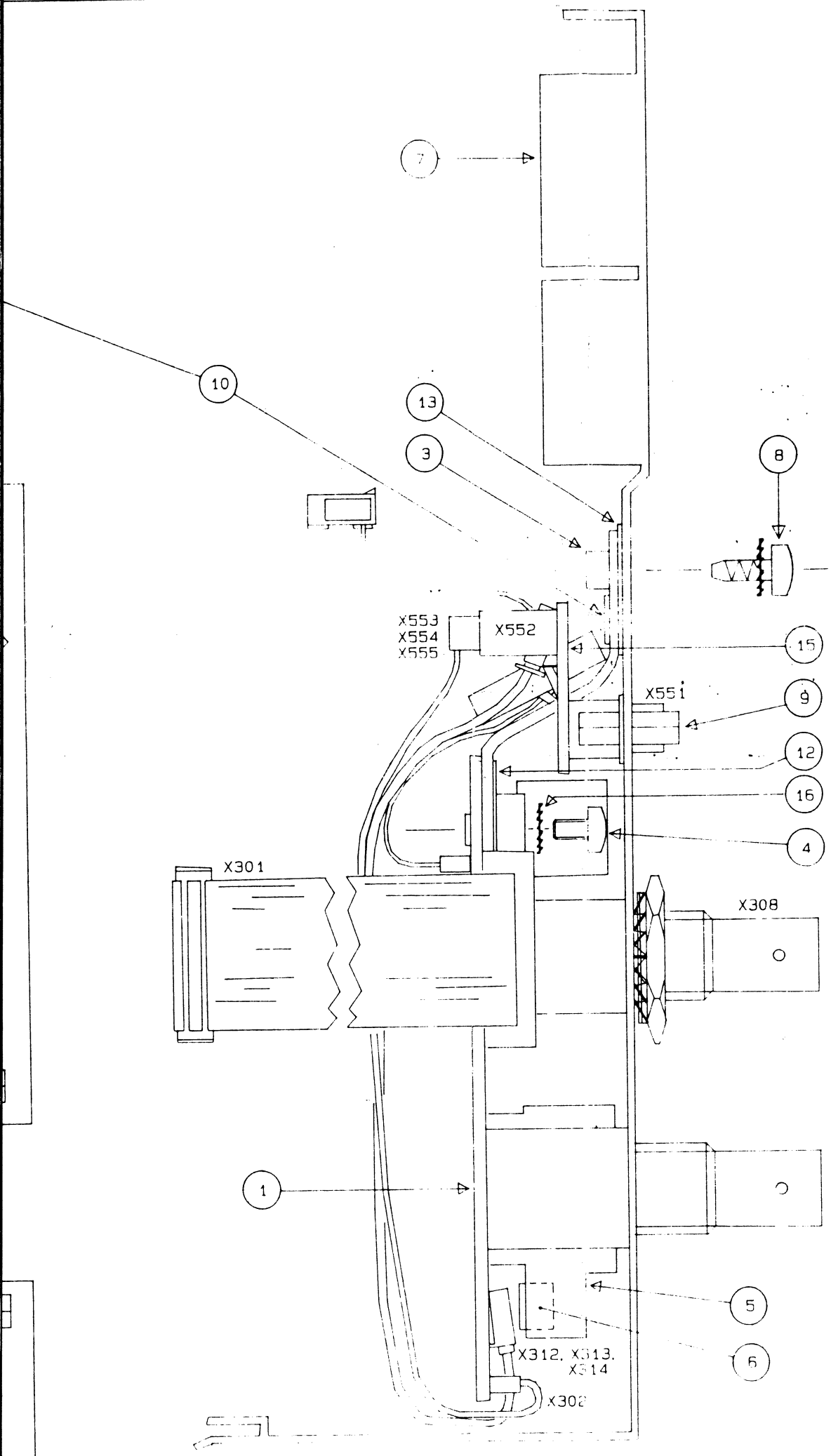

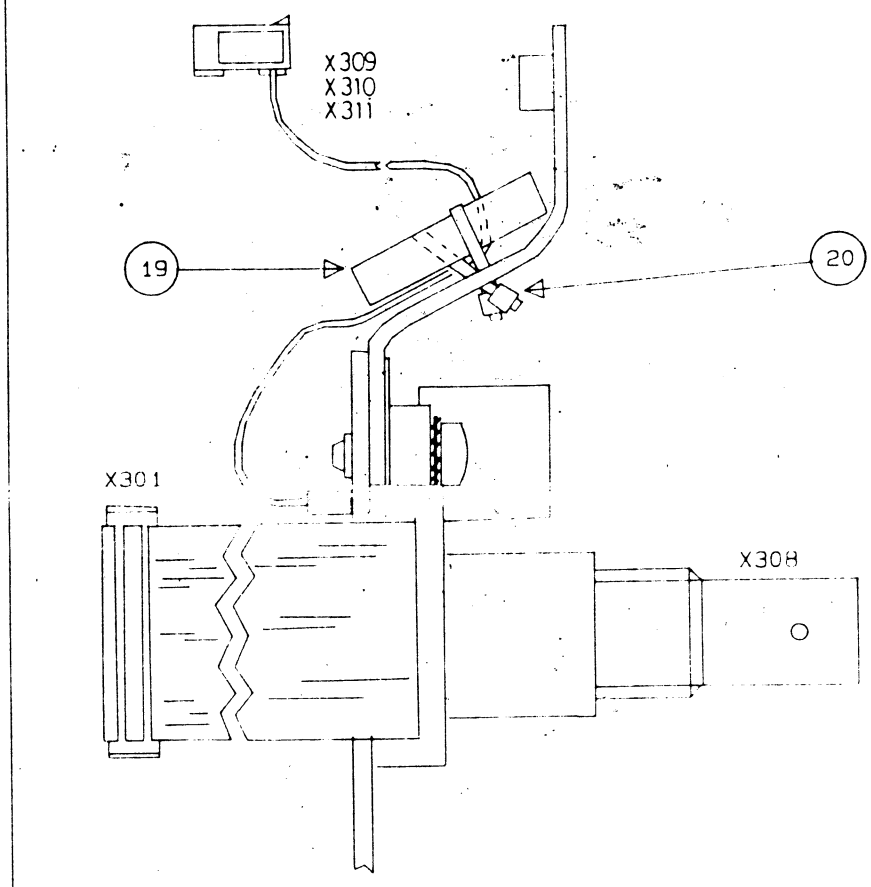

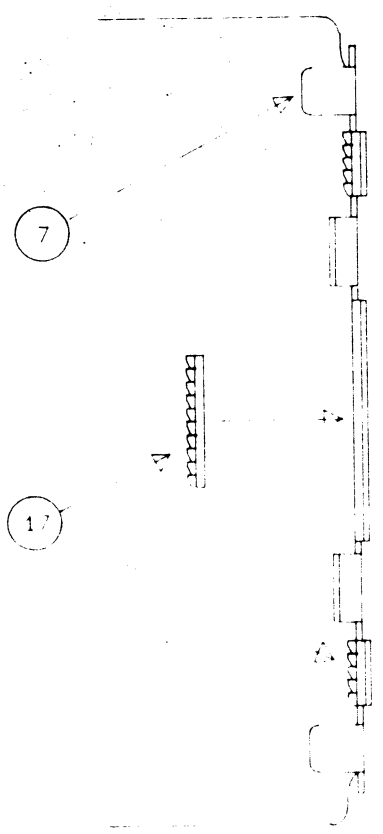

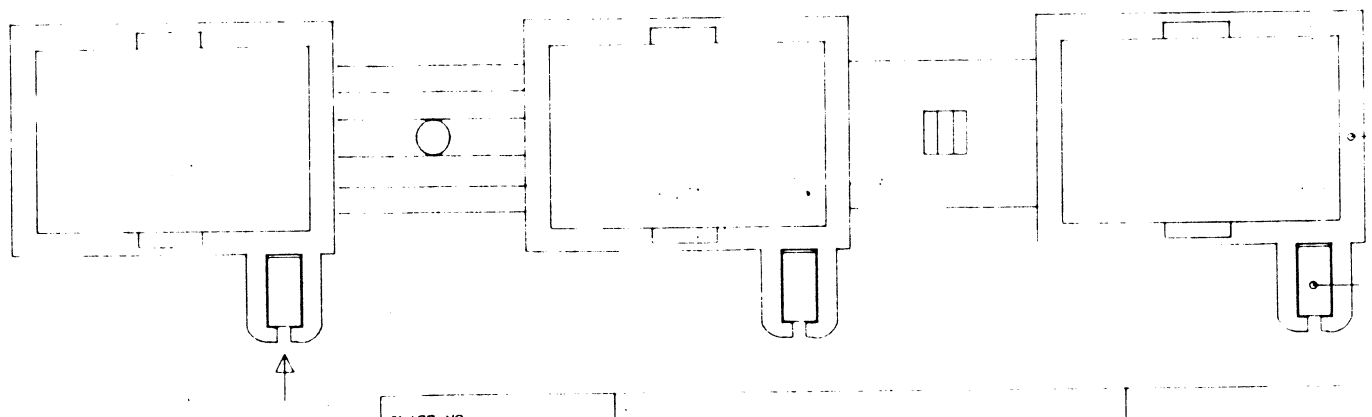

YELLOW SIDE OF THE MAGNET
LATO GIALLO DEL MAGNETE

CLASS NO	C20/2182 BRIDGE 94	3119 208 6367	1
94-02-04 CG	PCB VIDEO AMPL.		1 94-03-01
203 3564			
NAME GIAMPIERI	SUPERS.	1 SH	SH 110 – 1

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TUTTI I DIRITTI SONO STRETTAMENTE RISERVATI. LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI E VIETATA IN QUALSIASI FORMA SENZA AUTORIZZAZIONE SCRITTA DELLA PROPRIETARIA

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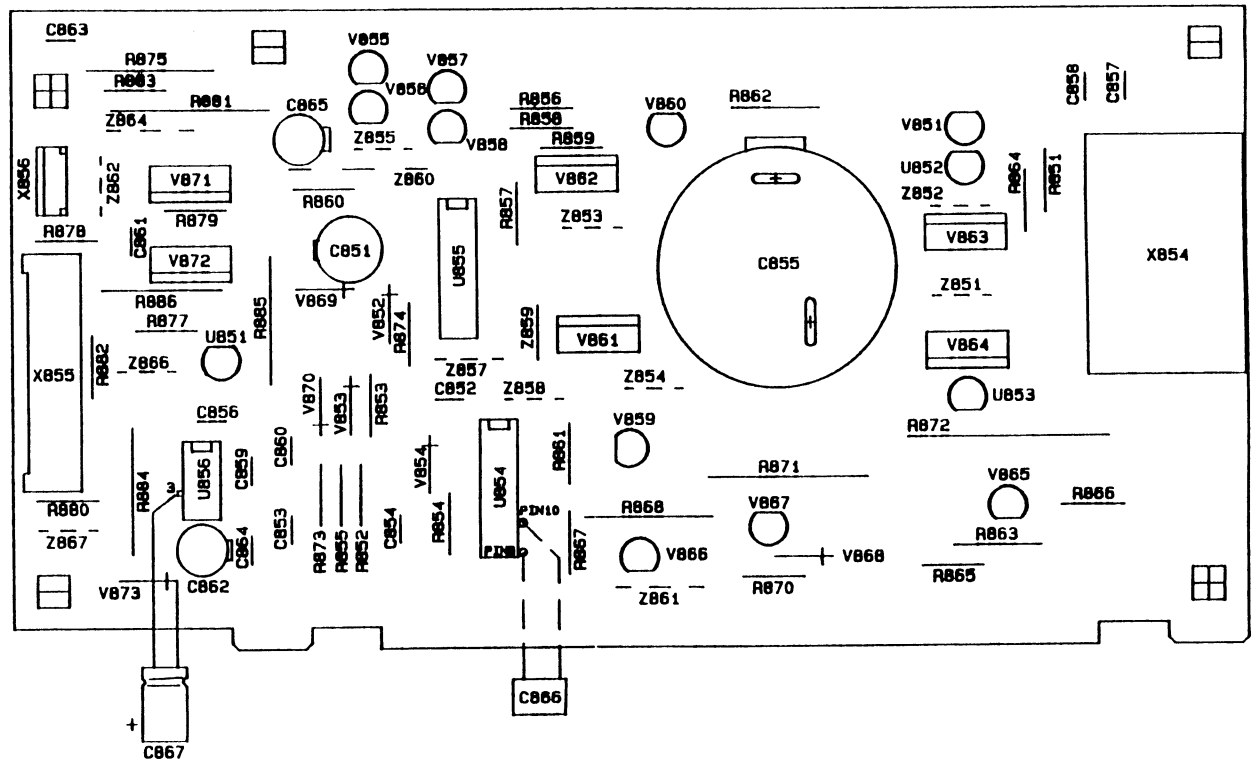

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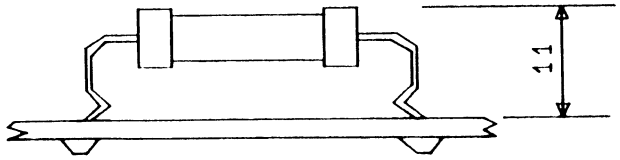
R872, R871, R868, R875,
R881, R884, R885



VENDOR SHALL CERTIFY COMPLIANCE WITH THE ENVIRONMENTAL REQUIREMENTS ACCORDING TO RULE : UAN-D1783

IL FORNITORE DEVE CERTIFICARE DI ESSERE CONFORME CON I REQUISITI AMBIENTALI SECONDO LE NORME: UAN-D1783

CLASS NO. 93-11-30 CG	C20-2182 DAS/TC DEGAUSS BOARD	3119 208 6361	1	-
			1	94-01-12
			1	94-01-31
203 3627			1	94-02-23
			1	94-03-16
NAME GIAMPIERI	SUPERS.	1 SH	SH. 110 — 1	
AN PROPERTY OF FIMI S.R.L. - MILANO - FABB. SARONNO - ITALY			CHECK	DATE 93-11-30	FORM.-A8

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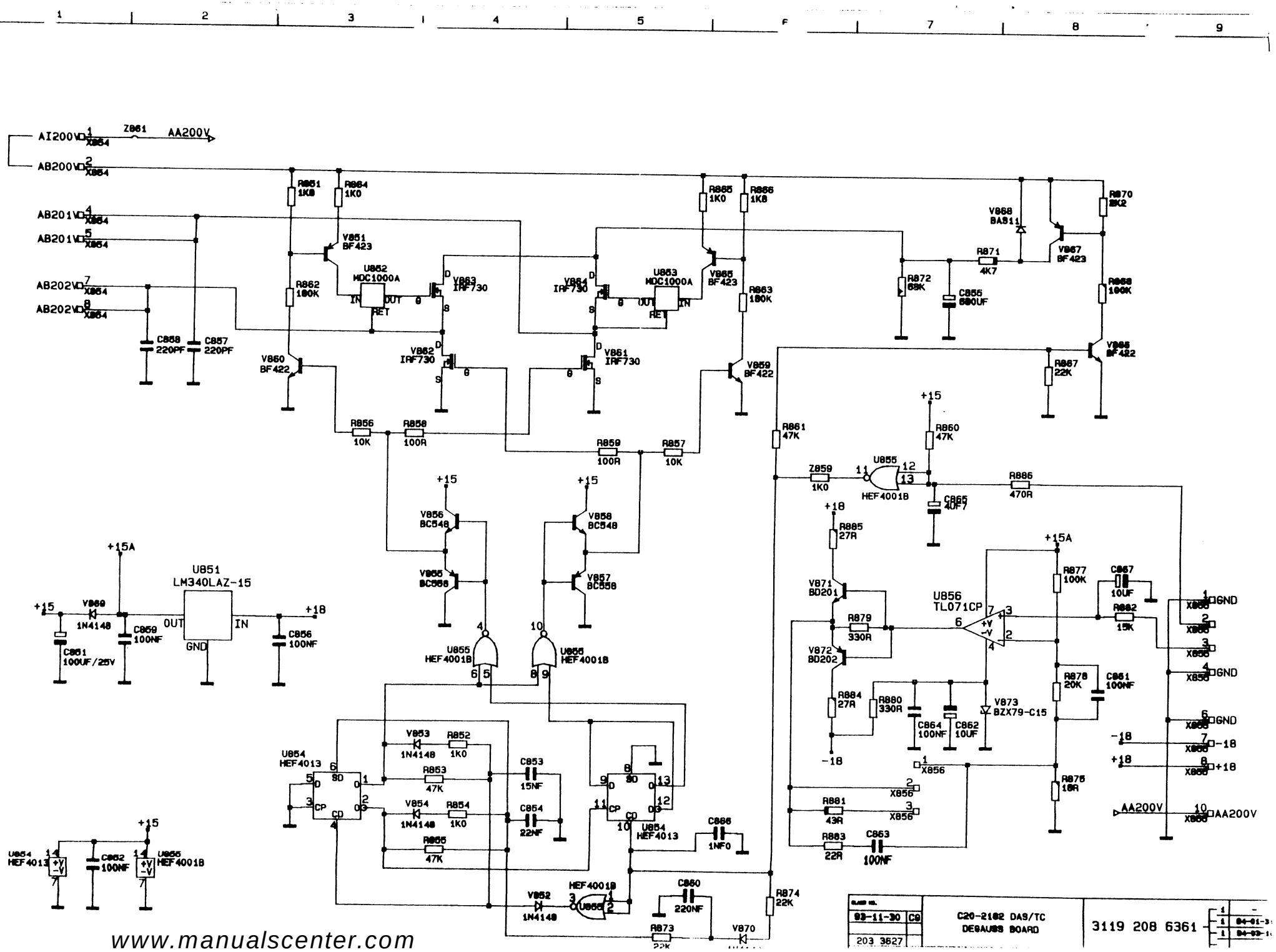

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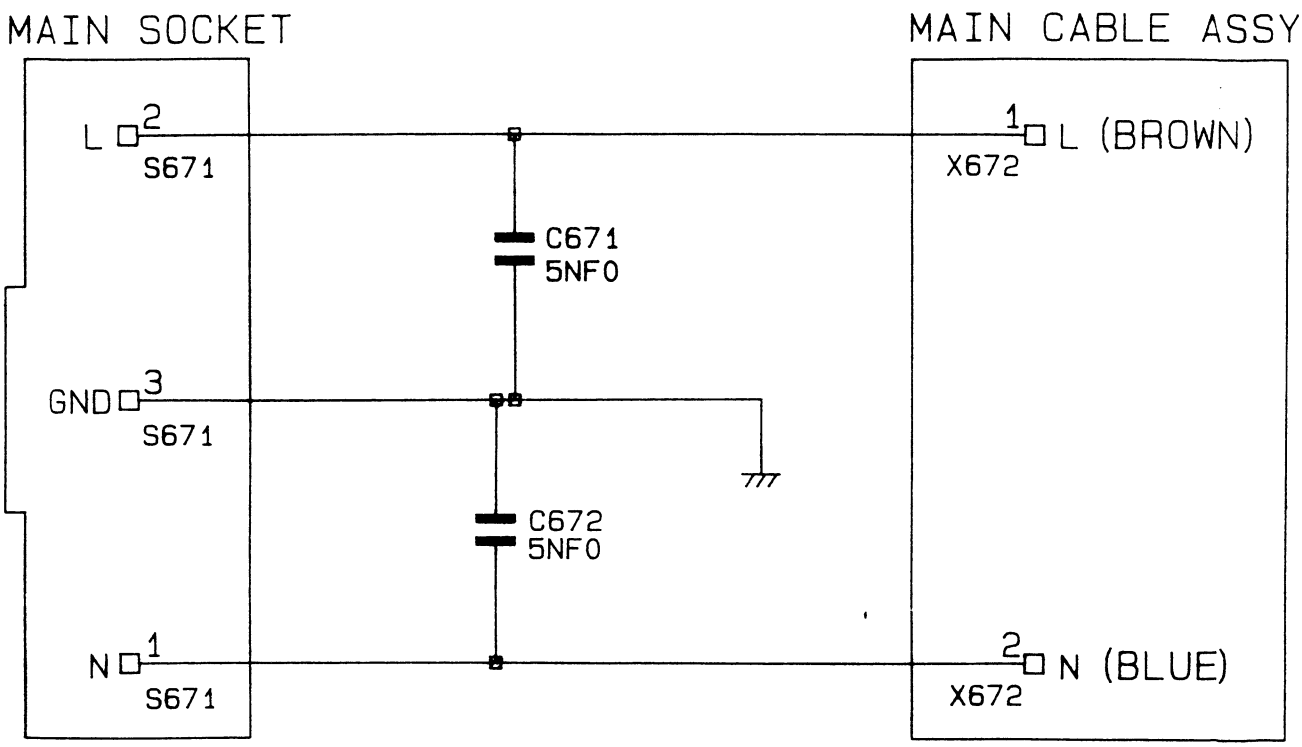
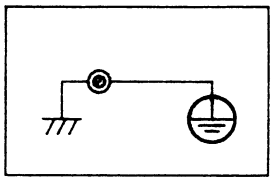
93-11-30 C9	C20-2162 DAS/TC DEGAUSS BOARD	3119 208 6361	
203 3627			





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CLASS NO.	ELECTRICAL DIAGRAM SCHEMA ELETTRICO P.C.B. MAIN SOCKET PANNELLO PRESA RETE CQ 94	3119 208 6352	1 - - -
93.09.28 DS			
NAME F. MONTI	SUPERS.	1 SH.	SH. 130 — 1
AN PROPERTY OF FIMI S.R.L. - MILANO - FABB. SARONNO - ITALY		CHECK	DATE 93.07.01 FORM. A4

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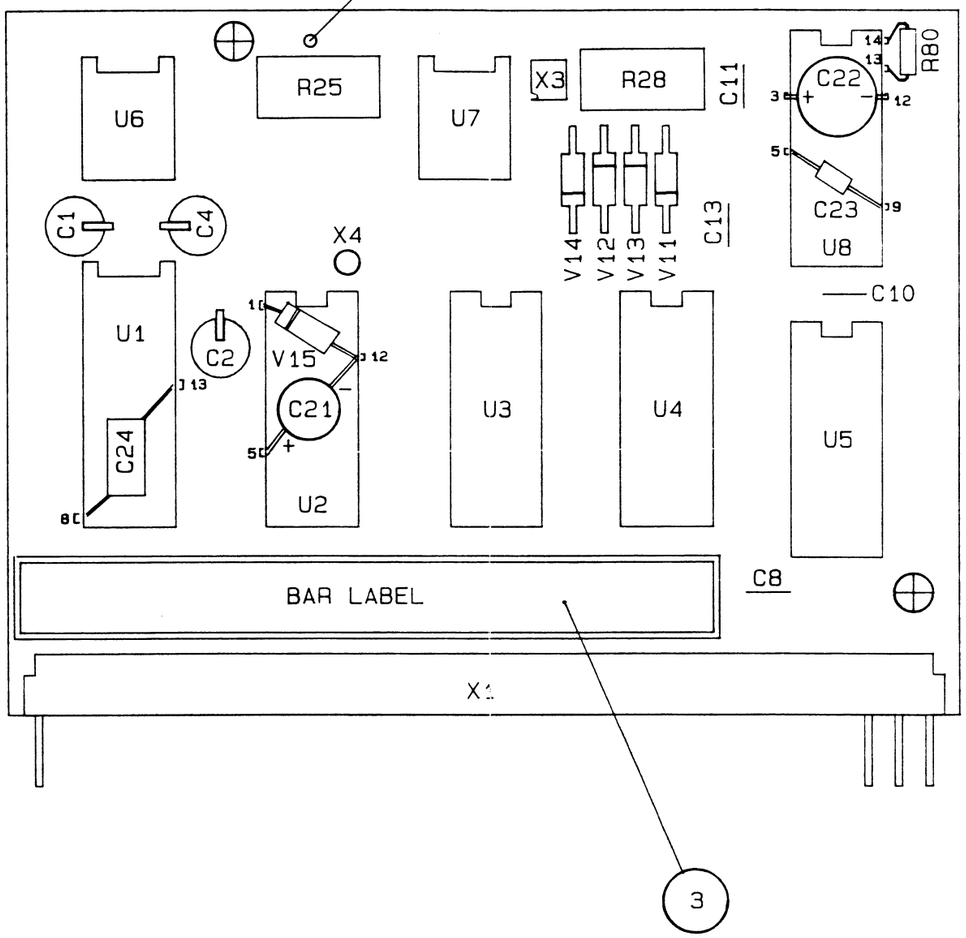
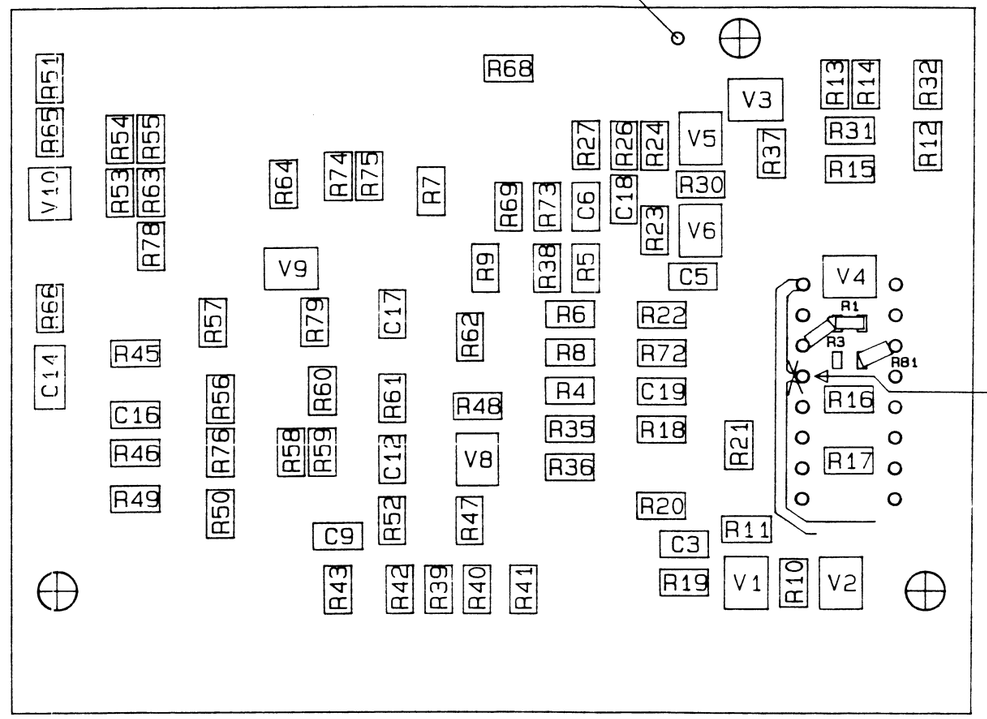
SILKSCREEN SIDE

LATO SERIGRAFIA



SOLDER SIDE

LATO SALDATURA



CUT TRACK BETWEEN +12A AND PIN 13 U1

TAGLIARE LA PISTA TRA +12A E PIN 13 U1

SOLDER PASTE MASK SOLDER SIDE : 3119 203 3612.1 SEE: SP02

MASCH. PASTA SALD. LATO SALD.: VEDI:

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IL FORNITORE DEVE CERTIFICARE QUANTO PREVISTO DALLA NORMA: UAN-D1783

CLASS NO.		C20DAS/BR	3119 208 6298	1 94-02-17 V
93-03-17	CG	LOW LEVEL SIGNALS BOARD ASSY		1 94-03-03 V
				1 94-03-11 G
203 3612				1 94-03-24 G
NAME A.VILLA		SUPERS.	1 SH.	SH. 110 — 1
AN	PROPERTY OF FIMI S.R.L. - MILANO - FABB. SARONNO - ITALY		CHECK	DATE 93-03-17 FORM. A3

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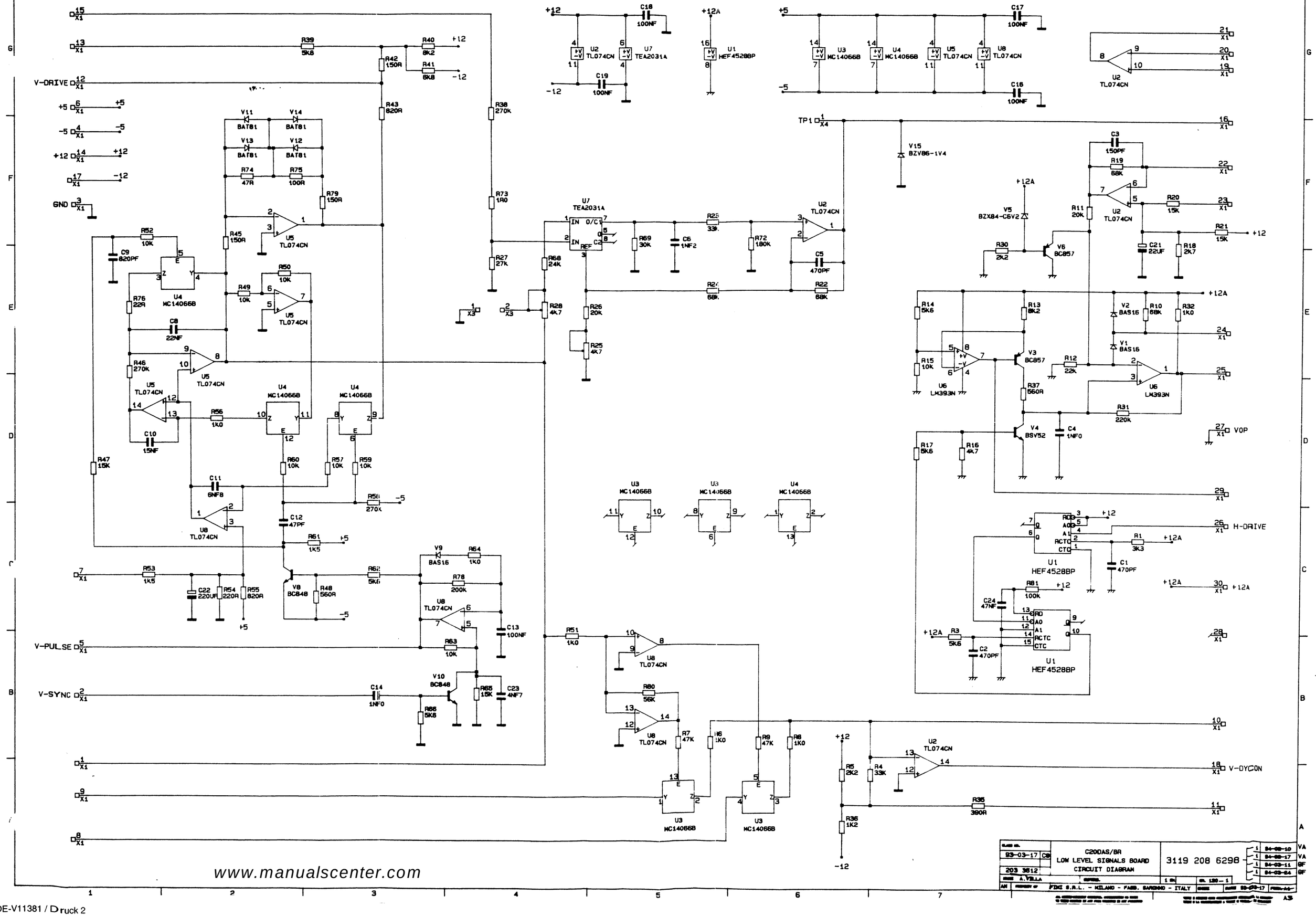
TUTTI I DIRITTI SONO STRETTAMENTE RISERVATI. LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI È VIETATA IN QUALSIASI



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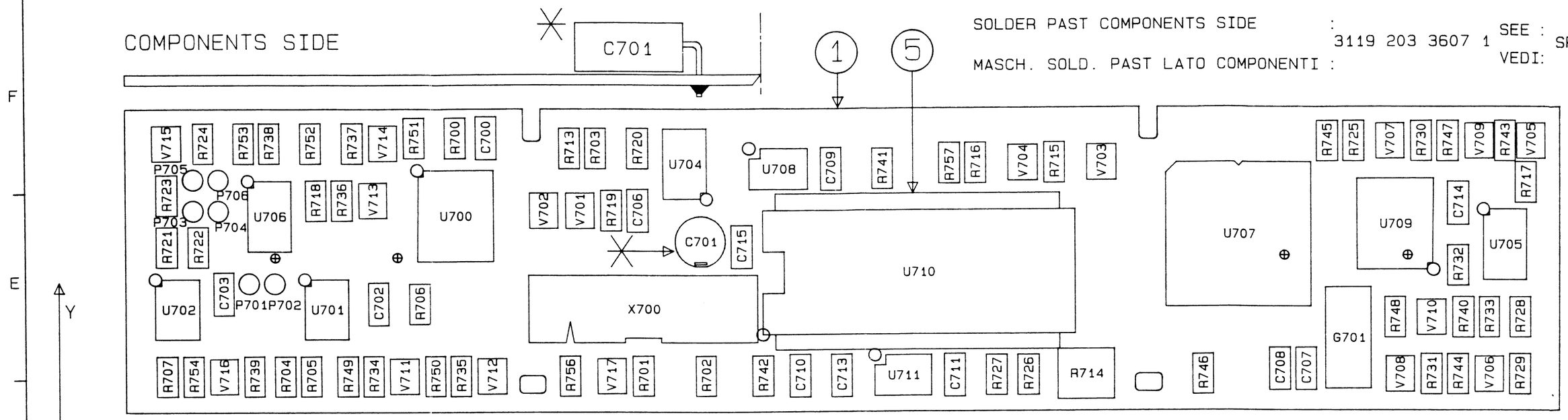
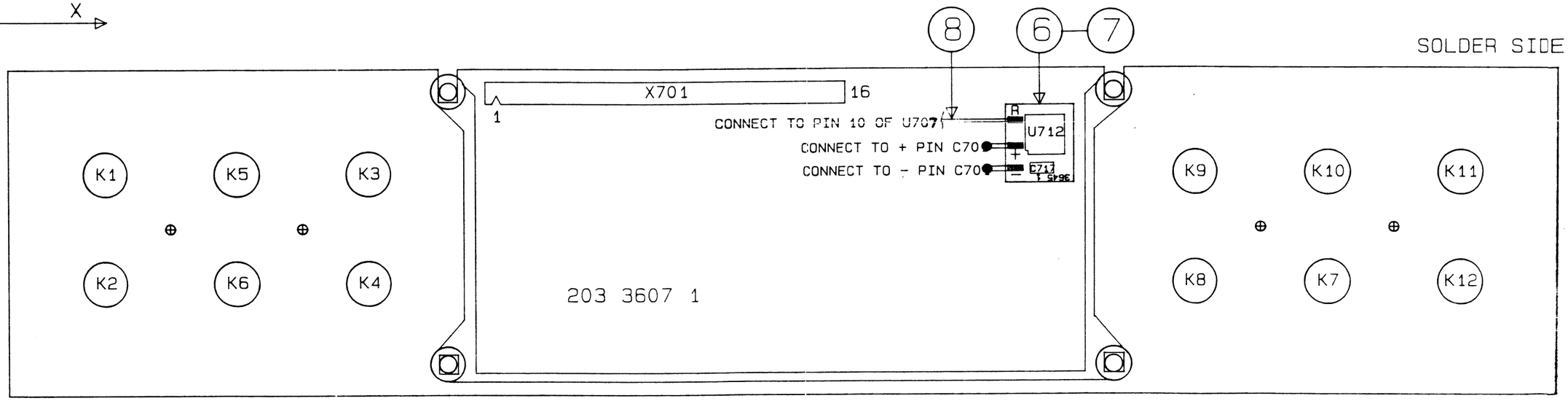
COMPONENTS SIDE

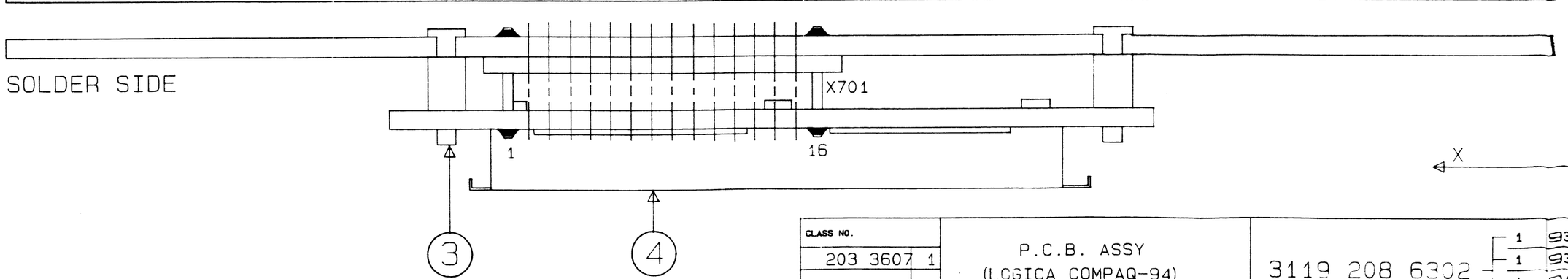
SOLDER PAST COMPONENTS SIDE :
3119 203 3607 1
MASCH. SOLD. PAST LATO COMPONENTI :

SEE :
VEDI: SP01



SOLDER SIDE





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CLASS NO. 203 3607 1	P.C.B. ASSY (LOGICA COMPAQ-94)	3119 208 6302	1 93-10-04
93-09-28 GC			1 93-10-06
			1 94-02-02
NAME MAZZEO	SUPERS.	1 SH.	SH. 110 — 1
AN PROPERTY OF FIMI S.R.L. - MILANO - FABB. SARONNO - ITALY		CHECK	DATE 92-10-26 FORM. A3

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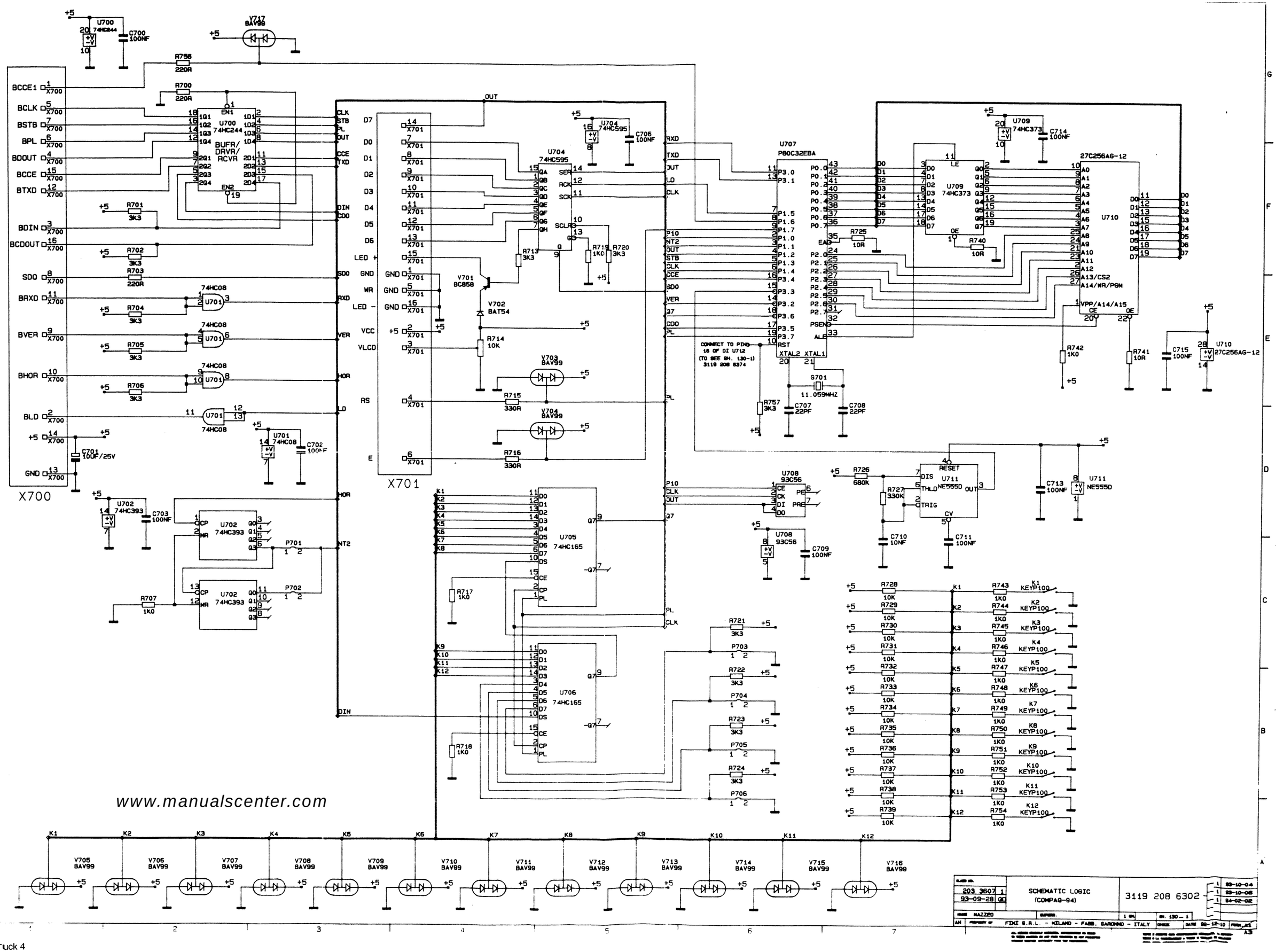
TUTTI I DIRITTI SONO STRETTAMENTE RISERVATI. LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI È VIETATA IN QUALUNQUE



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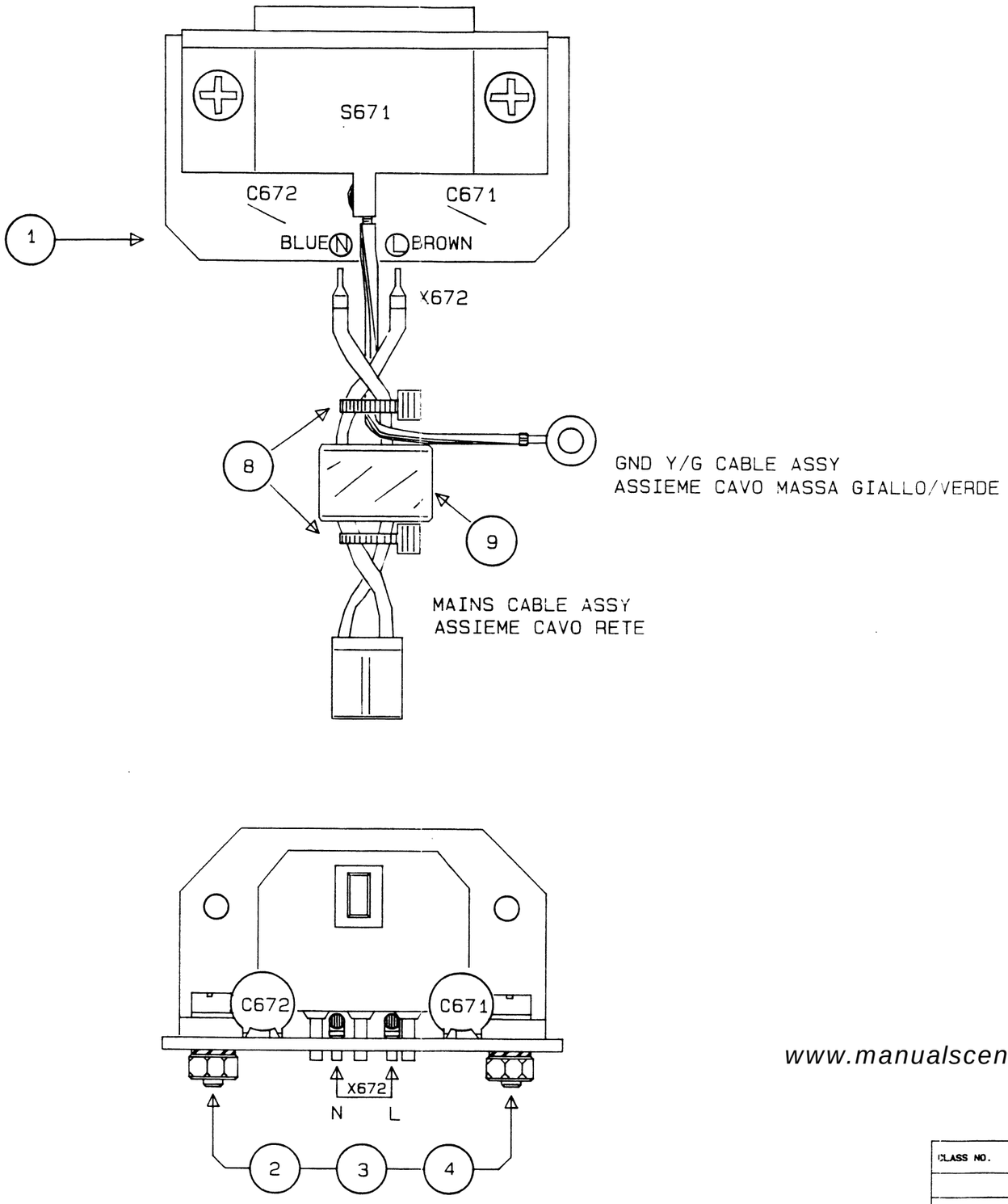

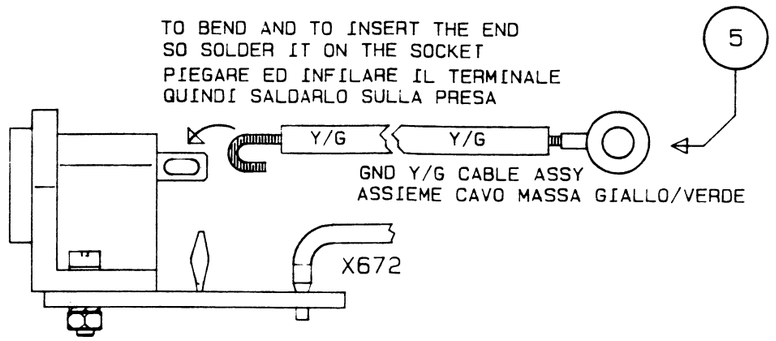

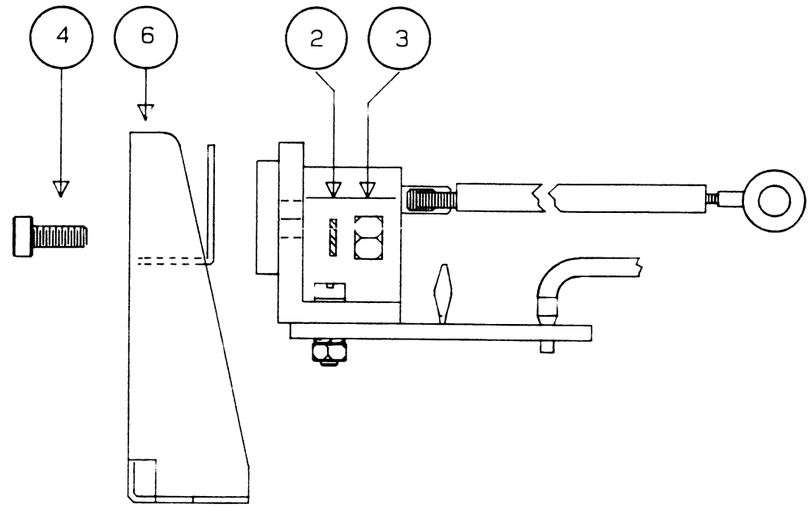

MAINS SOCKET BRACKET

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IL FORNITORE DEVE CERTIFICARE QUANTO PREVISTO DALLA NORMA UAN-D1783

CLASS NO.	P.C.B PANEL ASSIEME PANNELLO MAINS SOCKET PRESA RETE CQ/94	3119 208 6352	1 93.12.22
93.11.02 DS			
NAME F. MONTI	SUPERS.	1 SH.	SH. 110 — 1
AN PROPERTY OF FIMI S.R.L. - MILANO - FABB. SARONNO - ITALY		CHECK	DATE 93.11.04 FORM. A3

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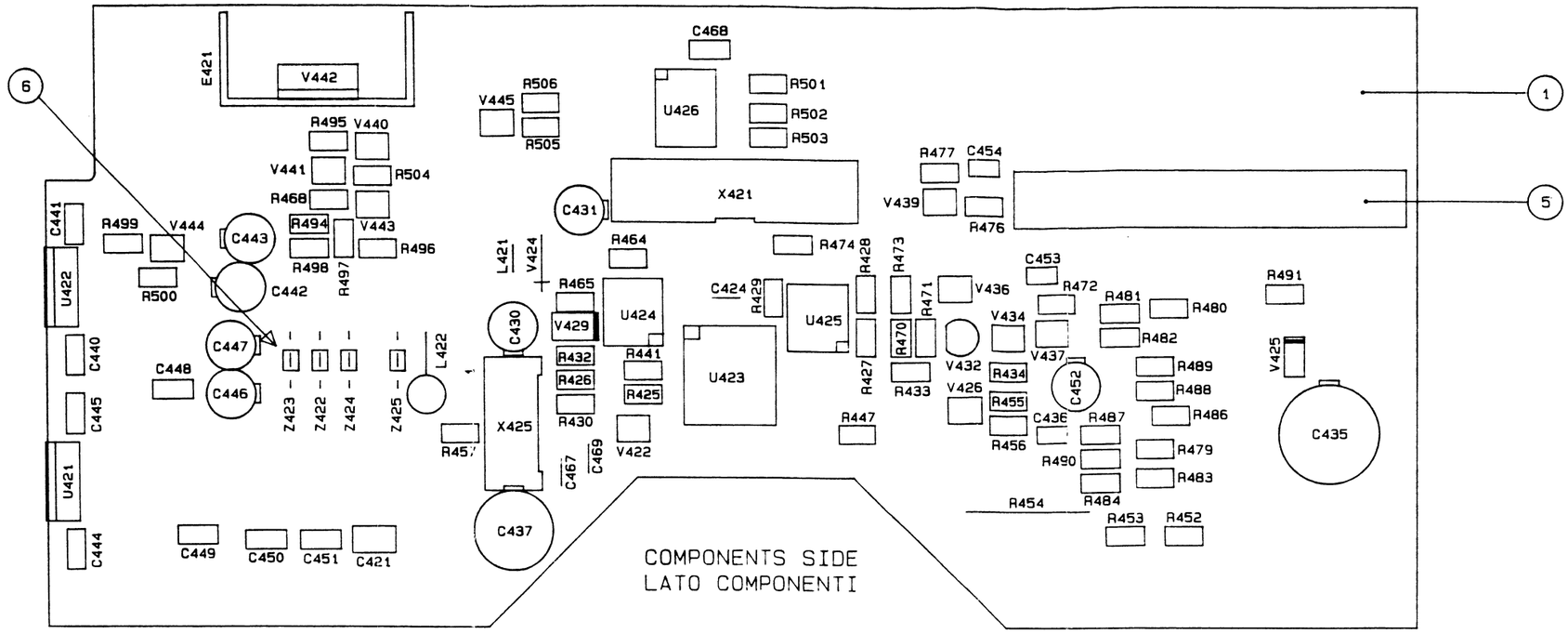
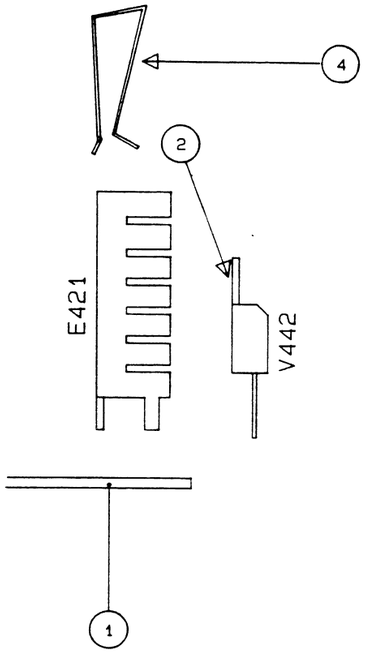
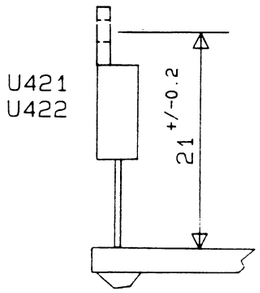
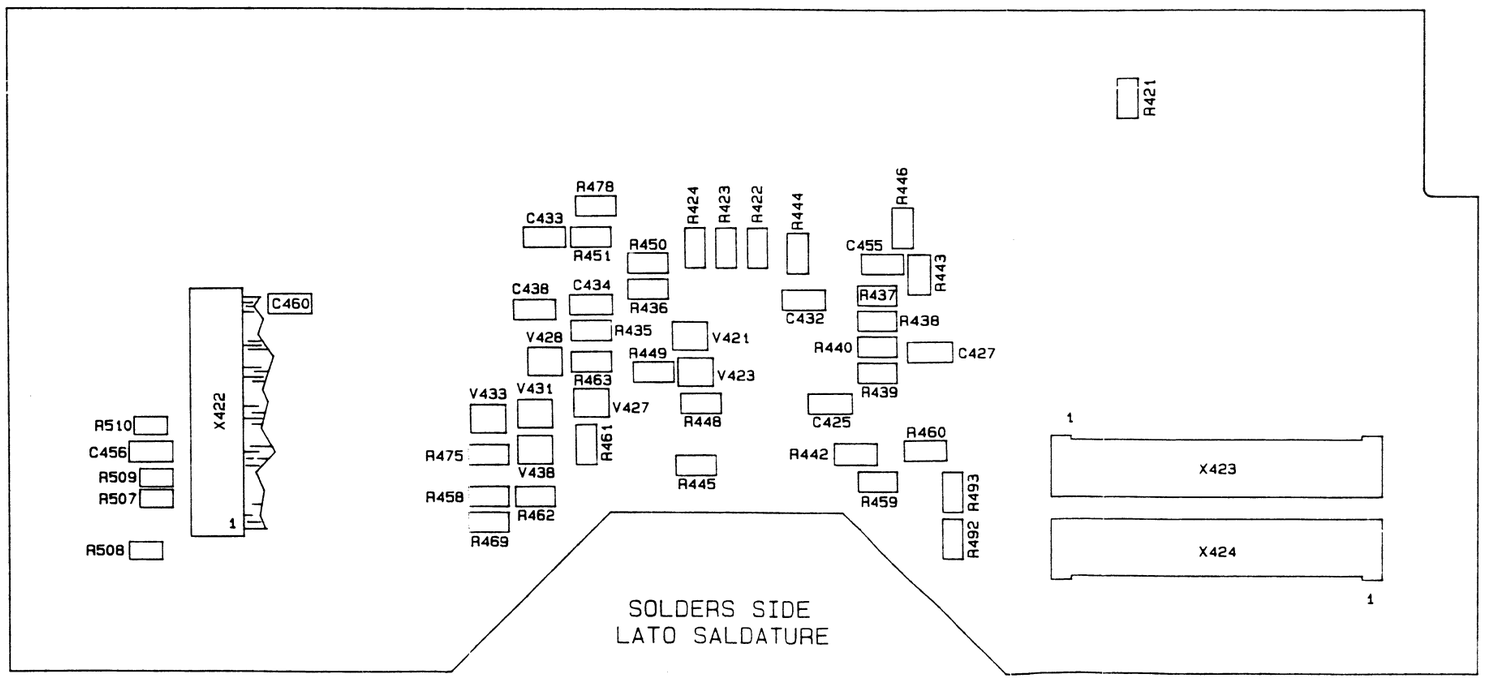
TUTTI I DIRITTI SONO STRETTAMENTE RISERVATI. LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI È VIETATA IN QUALUNQUE









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IL FORNITORE DEVE CERTIFICARE DI ESSERE CONFORME CON I REQUISITI AMBIENTALI SECONDO LE NORME: UAN-D1783

SOLDER PASTE MASK COMP. SIDE : 8219 253 3742.2 SEE : SP01
MASCH. PASTA SALD. LATO COMP.: VEDI:

SOLDER PASTE MASK SOLDER SIDE: 8219 253 3743.2 SEE : SP02
MASCH. PASTA SALD. LATO SALD.: VEDI:

CLASS NO.		C2082 DAS/BR-CQ 94 VIDEO INTERFACE BOARD	3119 208 6354
93-11-05	CG		1 –
			1 94-02-14
203 3638			1 94-02-24
			1 94-03-04
NAME GIAMPIERI	SUPERS.	1 SH.	SH. 110 — 1
AN PROPERTY OF FIMI S.R.L. - MILANO - FABB. SARONNO - ITALY		CHECK	DATE 93-11-05 FORM. A3

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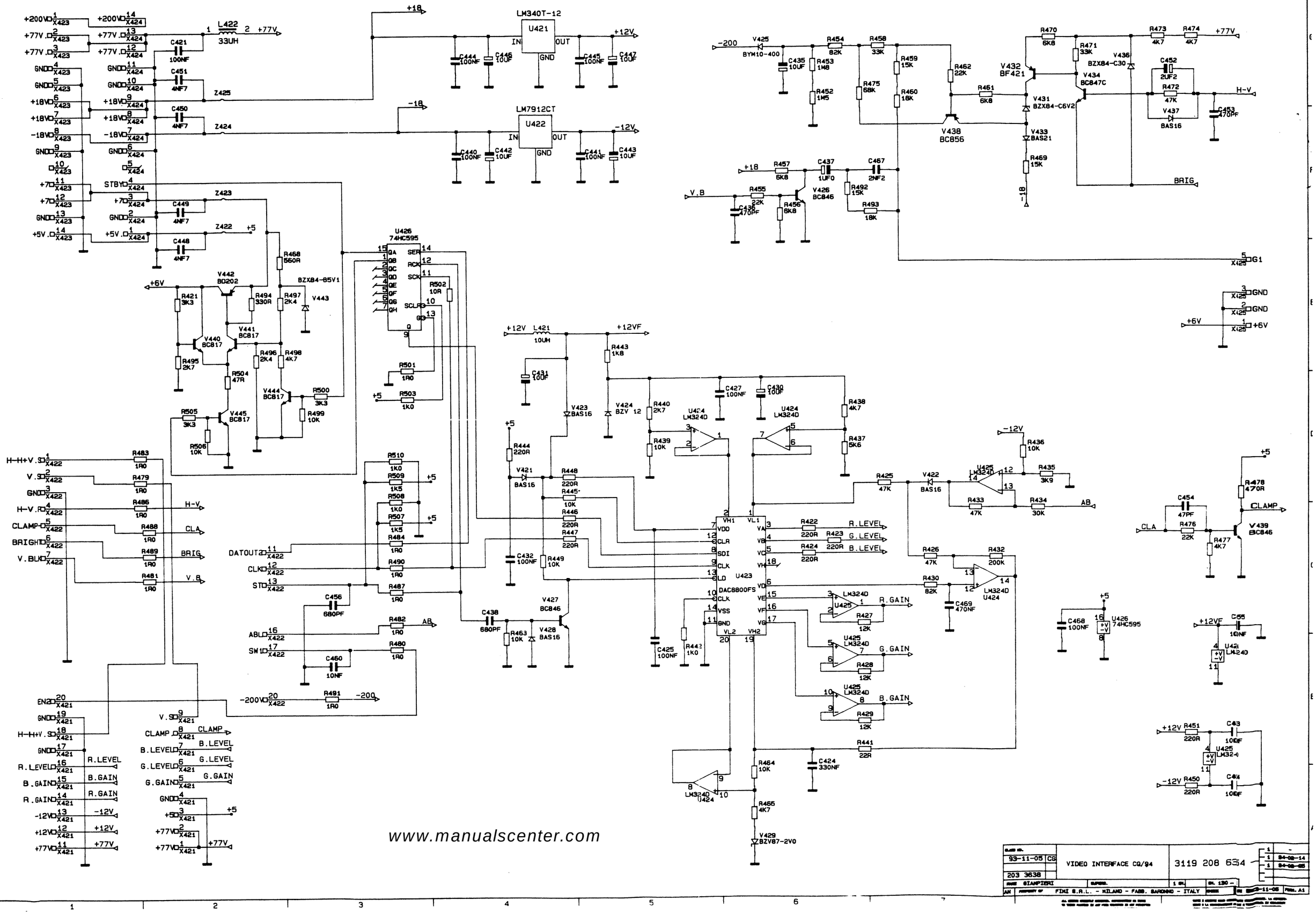
+200VD X423 1
+200VD X424 14
+77V X423 2
+77V X424 13
+77V X423 3
+77V X424 12
L422 33UH
C421 100NF
GND X423 4
GND X424 11
C451 4NF7
GND X423 5
GND X424 10
+18VD X423 6
+18VD X424 9
Z425
C450 4NF7
-18VD X423 8
-18VD X424 7
Z424
GND X423 9
GND X424 6
X423 10
X424 5
+7 X423 11
STBY X424 4
+7 X424 3
Z423
C449 4NF7
GND X423 13
GND X424 2
Z422
+5V X423 14
+5V X424 1
C448 4NF7
+18
LM340T-12
U421
IN
OUT
GND
+12V
C444 100NF
C446 10UF
C445 100NF
C447 10UF
-18
LM7912CT
U422
-12V
C440 100NF
C442 10UF
C441 100NF
C443 10UF
-200
V425 BYM10-400
C435 10UF
R454 82K
R458 33K
R453 1M8
R452 1M5
R475 68K
R459 15K
R460 18K
R462 22K
R461 6K8
R470 6K8
R471 33K
R473 4K7
R474 4K7
+77V
V436 BZX84-C30
C452 2UF2
V432 BF421
V434 BC847C
R472 47K
H-V
V437 BAS16
C453 470PF
V438 BC856
V431 BZX84-C6V2
V433 BAS21
R469 15K
-18
BRIG
+18
R457 6K8
C437 1UF0
C467 2NF2
V.B
R455 22K
C436 470PF
V426 BC846
R456 6K8
R492 15K
R493 18K
X425 5 G1
X425 3 GND
X425 2 GND
+6V X425 1 +6V
U426 74HC595
QA QB QC QD QE QF QG QH SER RCK SCK SCLR GG
R502 10R
R501 1R0
R503 1K0
+5
R468 560R
V442 BD202
BZX84-B5V1
V443
R421 3K3
R494 330R
R497 2K4
V441 BC817
V440 BC817
R495 2K7
R496 2K4
R498 4K7
R504 47R
V444 BC817
R500 3K3
R499 10K
R505 3K3
V445 BC817
R506 10K
+12V L421 10UH
+12VF
R443 1K8
C431 100F
V423 BAS16
V424 BZV 12
C427 100NF
C430 100F
U424 LM324D
R440 2K7
R439 10K
R438 4K7
R437 5K6
R444 220R
V421 BAS16
R448 220R
R445 10K
R446 220R
R447 220R
C432 100NF
R449 10K
C438 680PF
R463 10K
V428 BAS16
V427 BC846
C425 100NF
R442 1K0
R464 10K
R455 4K7
V429 BZV87-2V0
R441 22R
C424 330NF
U423 DAC8800FS
VH1 VL1 VDD VA CLR VB SDI VC CLK VH LD VD VE VSS VF GND VG VL2 VH2
R422 220R R.LEVEL
R423 220R G.LEVEL
R424 220R B.LEVEL
R.GAIN
G.GAIN
B.GAIN
R427 12K
R428 12K
R429 12K
R425 47K
R426 47K
R430 82K
R432 200K
R435 3K9
R436 10K
R433 47K
R434 30K
AB
V422 BAS16
R478 470R
CLAMP
V439 BC846
C454 47PF
R476 22K
R477 4K7
CLA
C468 100NF
C55 10NF
C469 470NF
R483 1R0
R479 1R0
R486 1R0
R488 1R0
R489 1R0
R481 1R0
R510 1K0
R509 1K5
R508 1K0
R507 1K5
R484 1R0
R490 1R0
R487 1R0
R482 1R0
R480 1R0
C456 680PF
C460 10NF
R491 1R0
H-H+V.SD X422 1
V.SD X422 2
GND X422 3
H-V.RD X422 4
CLAMP-D X422 5
BRIGHTD X422 6
V.BLKD X422 7
DATOUT X422 11
CLKO X422 12
STD X422 13
ABLD X422 16
SWID X422 17
-200VD X422 20
EN2D X421 20
GND X421 19
H-H+V.SD X421 18
GND X421 17
R.LEVELD X421 16
B.GAIN X421 15
R.GAIN X421 14
-12VD X421 13
+12VD X421 12
+77VD X421 11
V.SD X421 9
CLAMP X421 8
B.LEVELD X421 7
G.LEVELD X421 6
G.GAIN X421 5
GND X421 4
+5 X421 3
+77VD X421 2
+77VD X421 1
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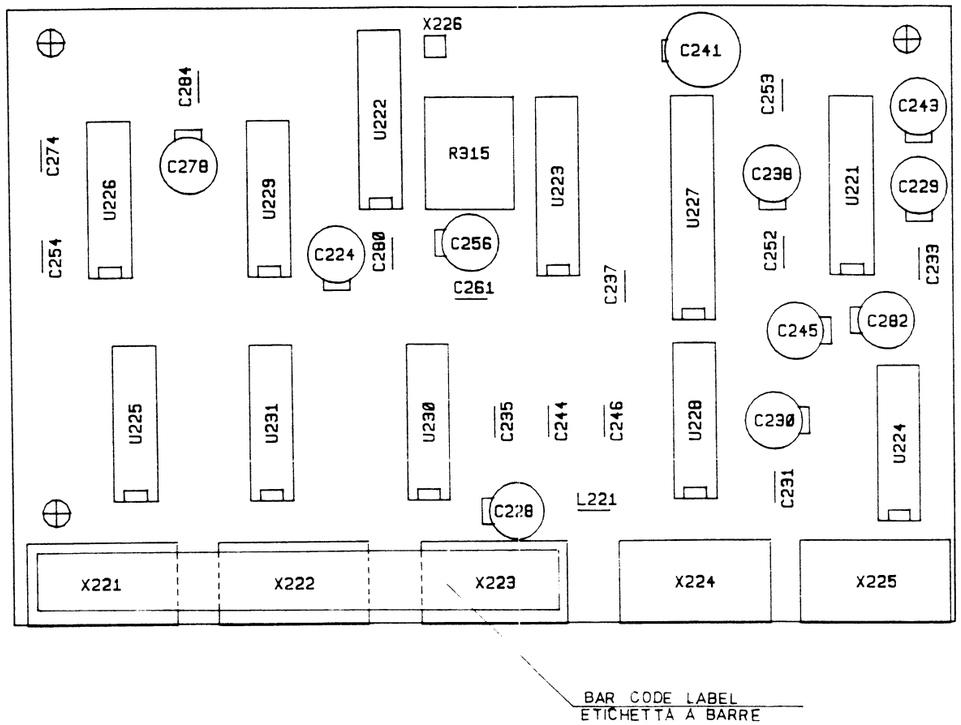
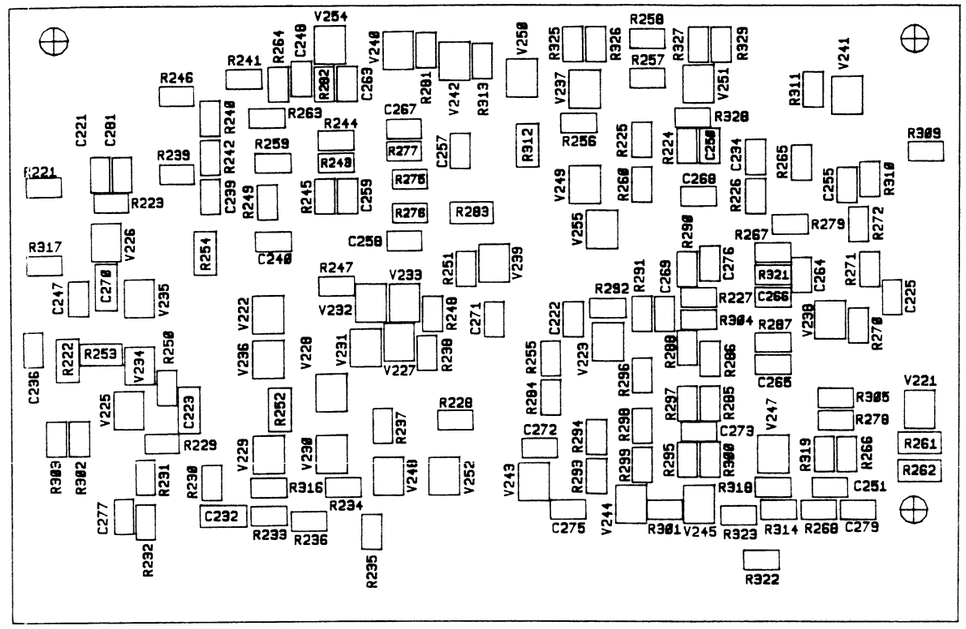
93-11-05 CG
203 3638
GIAMPIERI
VIDEO INTERFACE CQ/94
3119 208 6354
FIMI S.R.L. - MILANO - FABB. BARDANO - ITALY
04-08-14
04-08-05
04-11-08





VENDOR SHALL CERTIFY COMPLIANCE WITH THE
ENVIRONMENTAL REQUIREMENTS ACCORDING TO
RULE : UAN-D1783

IL FORNITORE DEVE CERTIFICARE DI ESSERE
CONFORME CON I REQUISITI AMBIENTALI SECONDO
LE NORME: UAN-D1783

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SOLDER PASTE SOLDER SIDE :
SOLDER PASTE LATO SALDATURE : 8219 253 3606.4 SEE : VEDI: SP02

CLASS NO.		C20-2182 DAS/BR	3119 208 6373	1 -
94-02-10	CG	HOR. SYNCR. BOARD		1 94-03-15
				1 94-03-18
203 3605				1 94-06-15
NAME GIAMPIERI		SUPERS.	3 SH.	SH. 110 — 1 - -
AN PROPERTY OF FIMI S.R.L. - MILANO - FABB. SARONNO - ITALY			CHECK	DATE 94-02-10 FORM. A3

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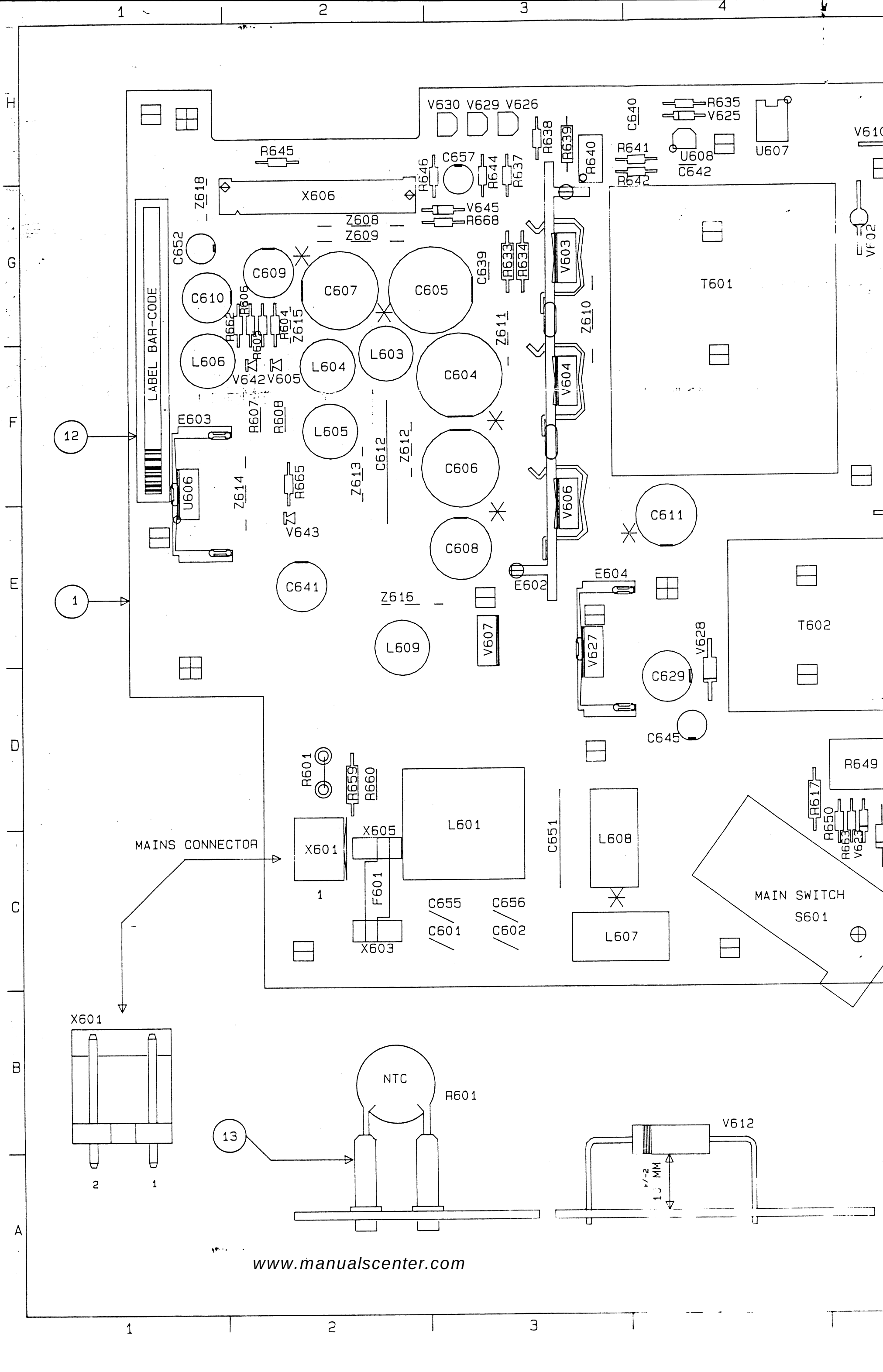

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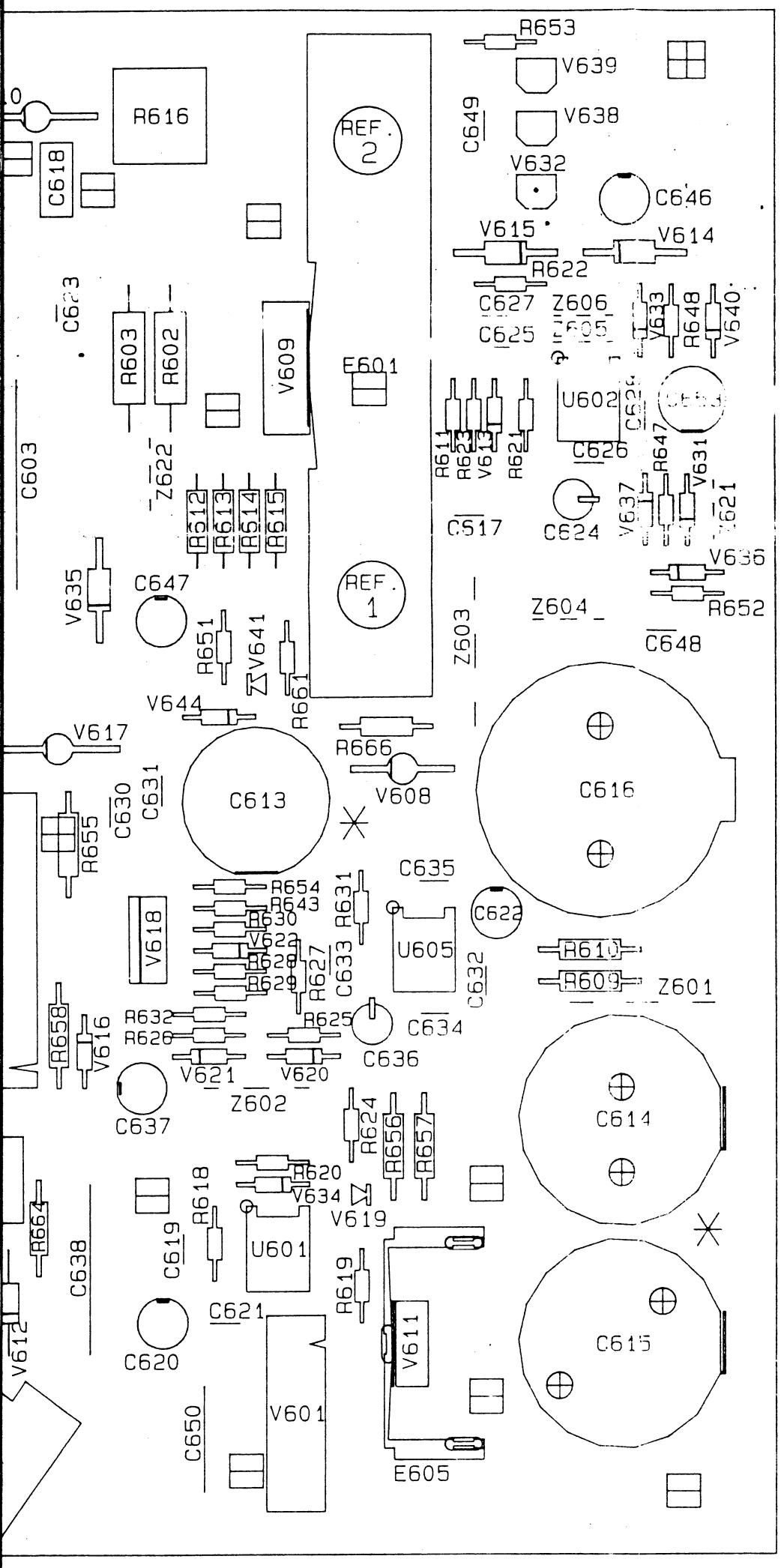
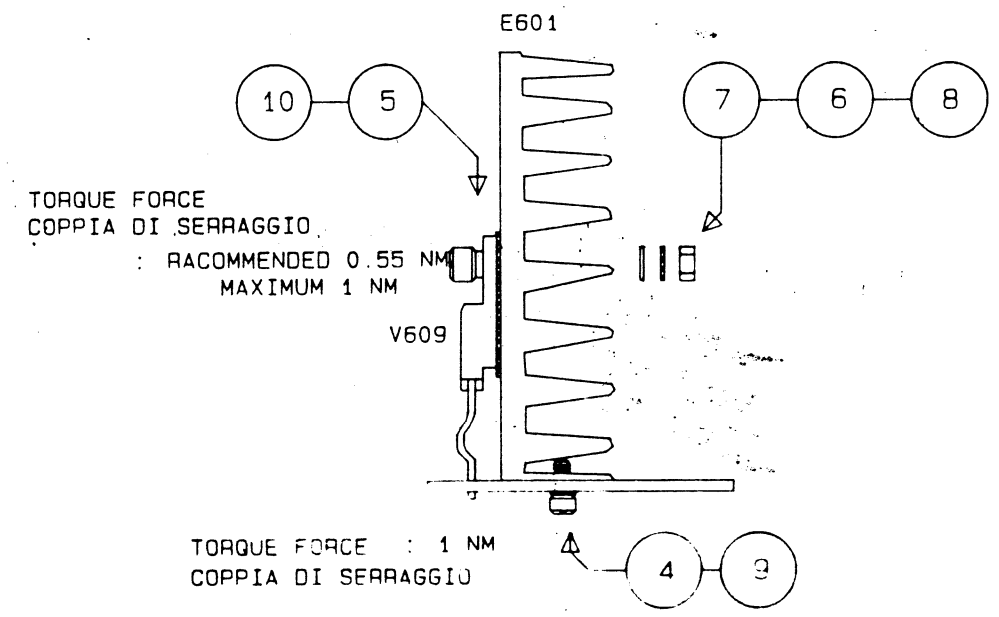
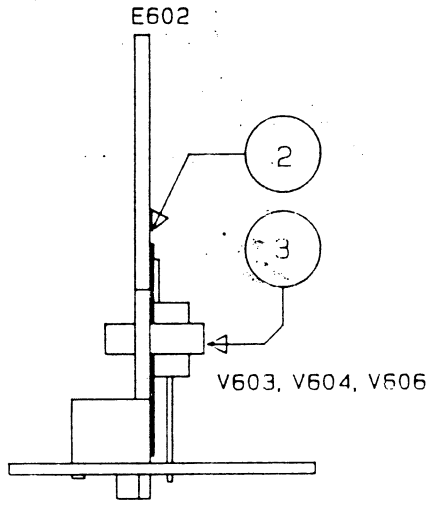


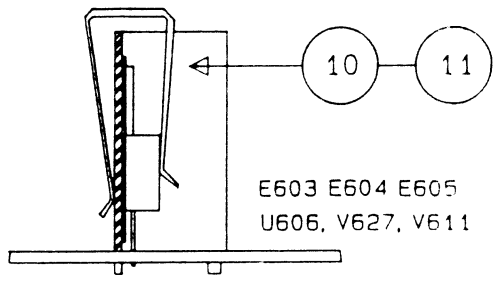


TO MOUNT THE LOCK WASHER FOR BOTH FIX POSITIONS

MONTARE LA RONDELLA DENTELLATA
PER ENTRAMBE LE POSIZIONI DI FISSAGGIO



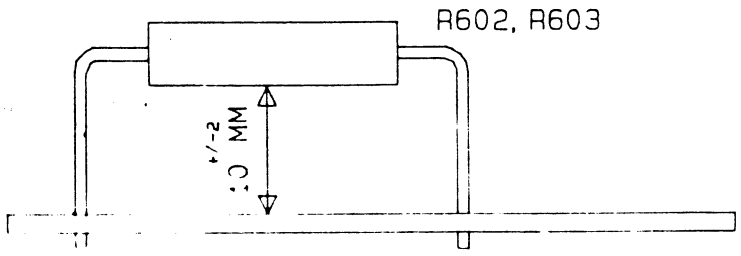
TWIST THE ENDS
TORCERE I TERMINALI



TWIST THE ENDS
TORCERE I TERMINALI

COMPONENTS SIDE
LATO COMPONENTI

✳ = ITEMS WHERE IS POSSIBLE INSERT THE VIBRATIONS DAMPER GLUE
POSIZIONI DOVE E` POSSIBILE INSERIRE DELLA COLLA ANTI-VIBRAZIONI



VENDOR SHALL CERTIFY COMPLIANCE WITH THE ENVIRONMENTAL REQUIREMENTS ACCORDING TO RULE : UAN-D1783

IL FORNITORE DEVE CERTIFICARE QUANTO PREVISTO DALLA NORMA UAN-D1783

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CP 6189

CLASS NO.	P.C.B. PANEL ASSIEME PANNELLO S.M.P.S. C20-CQ94	3119 208 6293	1 93.10.14 A
93 09.28 D S			1 93.11.09
			1 93 12.01
			1 93.12.07
			1 94.03.01
NAME F. MONTI	SUPERS.	1 SH	SH. 110 — 1
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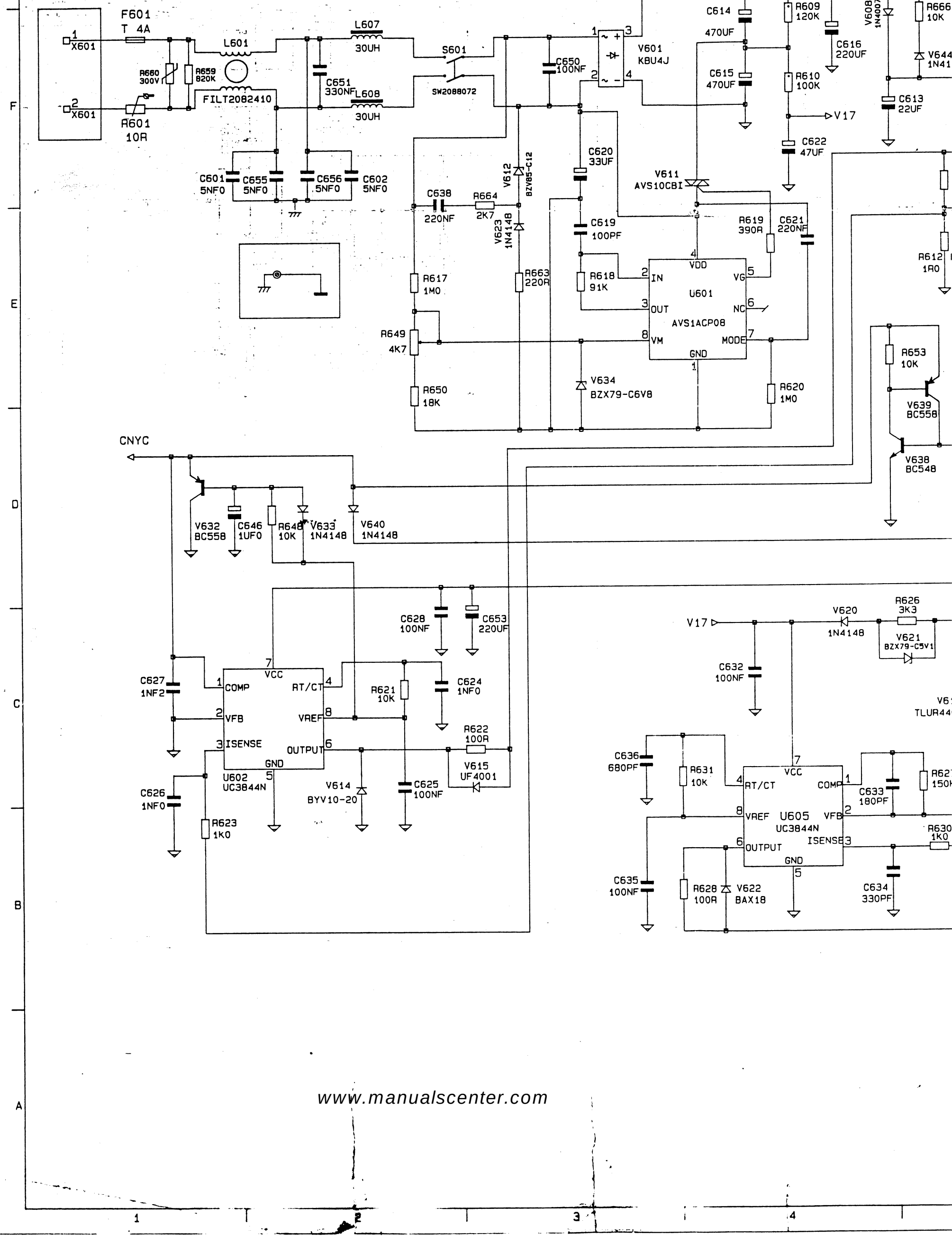

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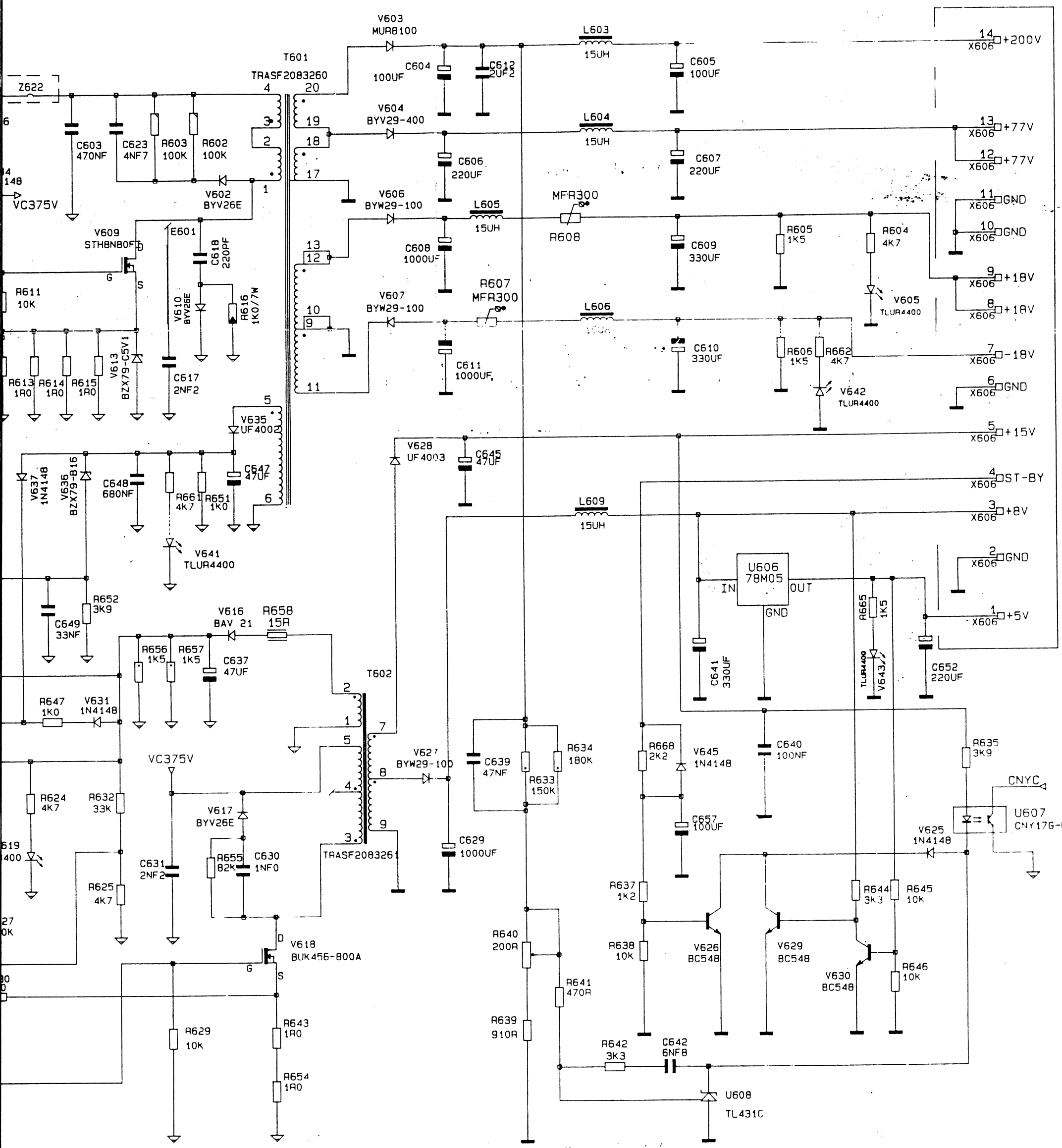

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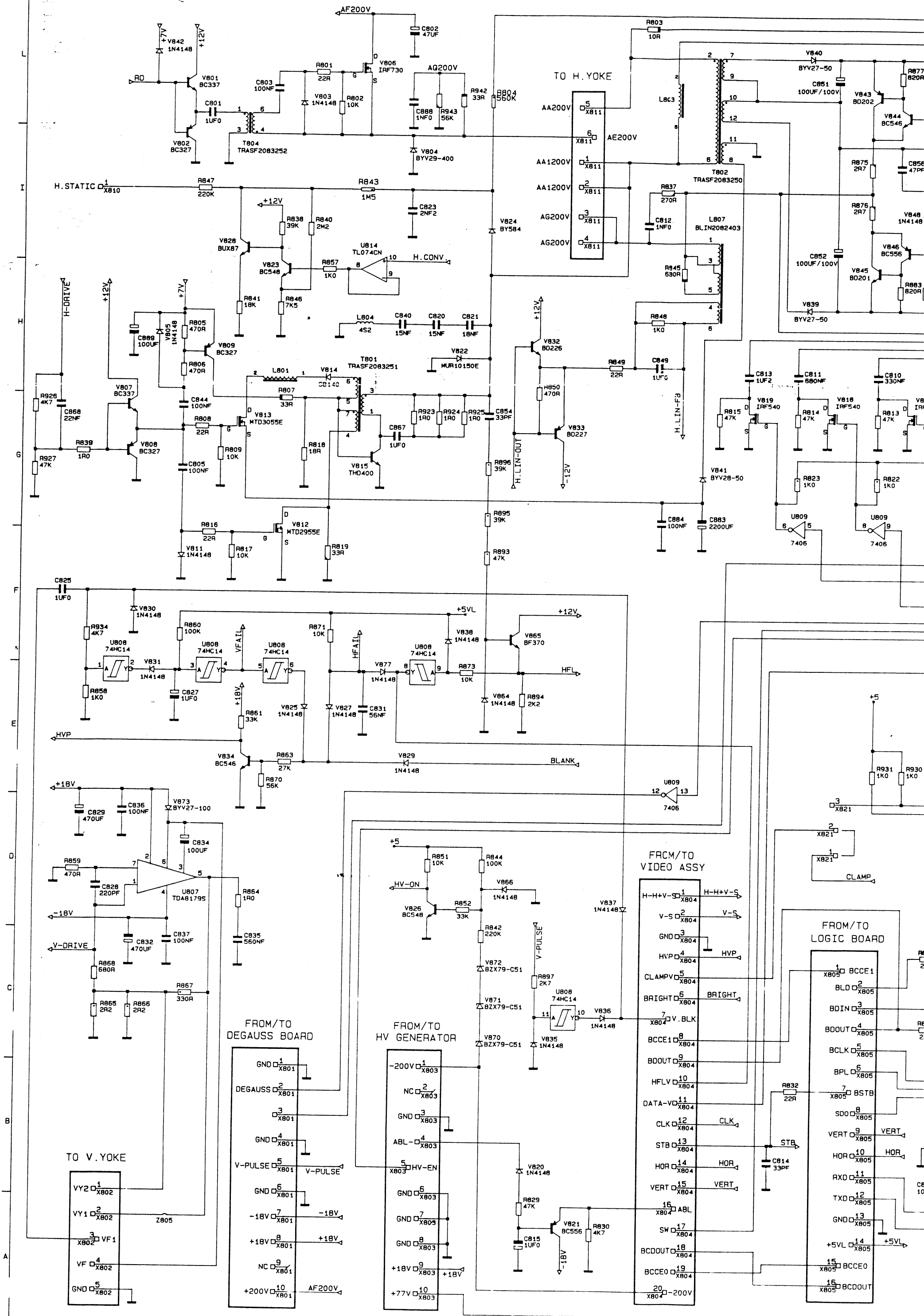
CLASS NO. 2033630	ELECTRICAL DIAGRAM SCHEMA ELETTRICO SMPS C20-CQ94	3119 208 6293	1 — — —
93.09.28 D.S			1 93.11.08
NAME F. MONTI	SUPERS. 1 SH	SH. 130 – 1	1 93.12.01
AN PROPERTY OF FIMI S.R.L. – MILANO – FABB. SARONNO – ITALY	CHECK	DATE 93.06 15	1 93.12.07
		FORM. A1	1 94.03.01

CP 6188



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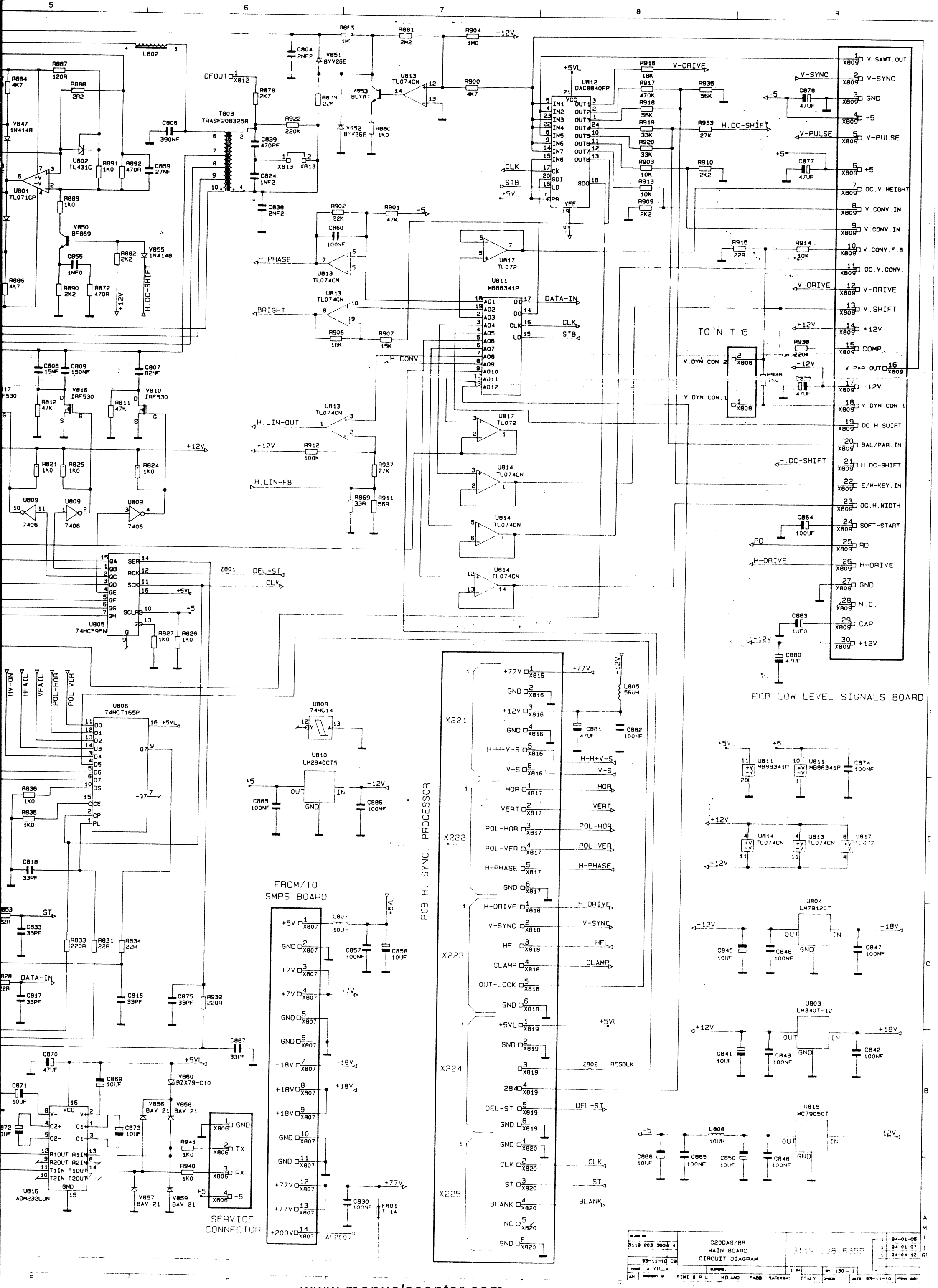

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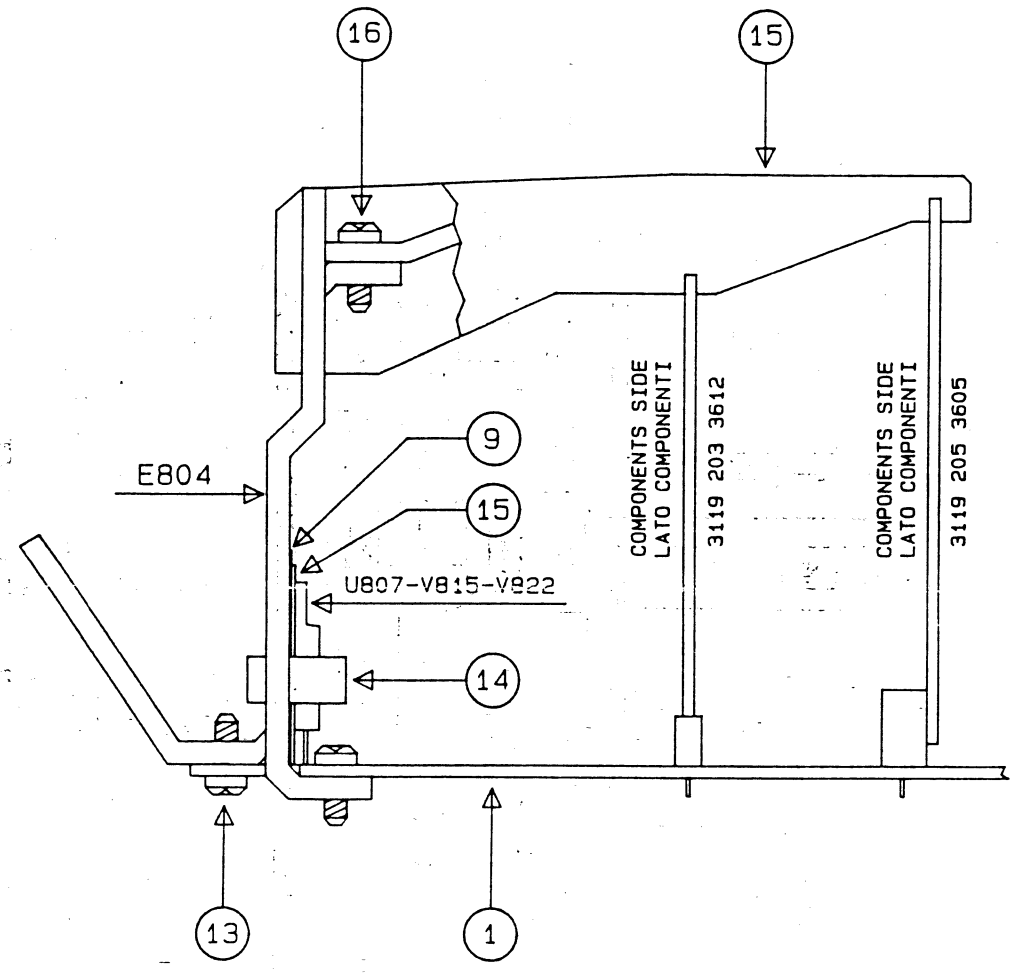
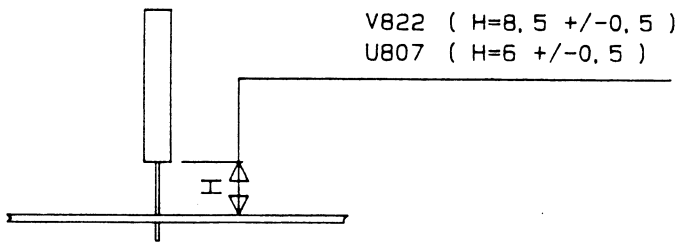
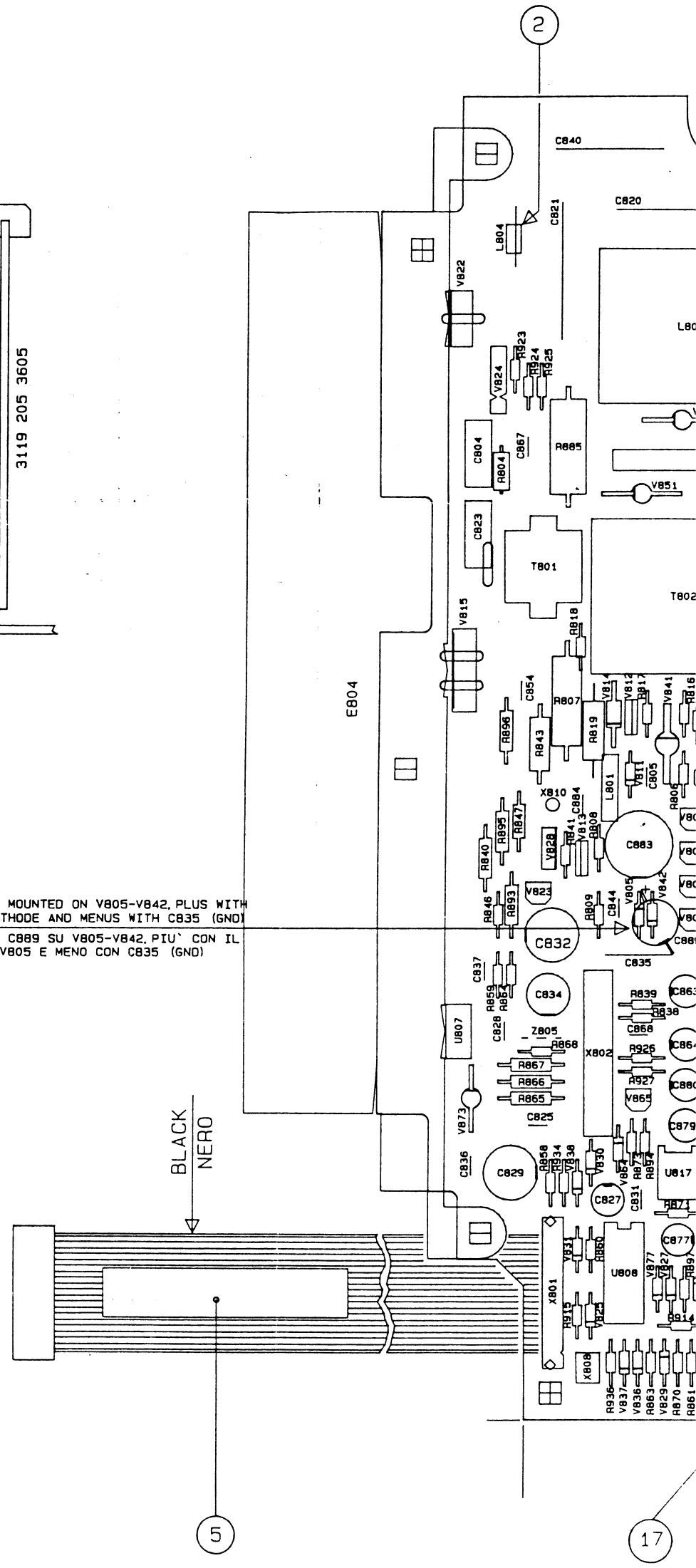




C889 IS MOUNTED ON V805-V842, PLUS WITH V805 CATHODE AND MENUS WITH C835 (GND)

MONTARE C889 SU V805-V842, PIU` CON IL CATODO V805 E MENO CON C835 (GND)



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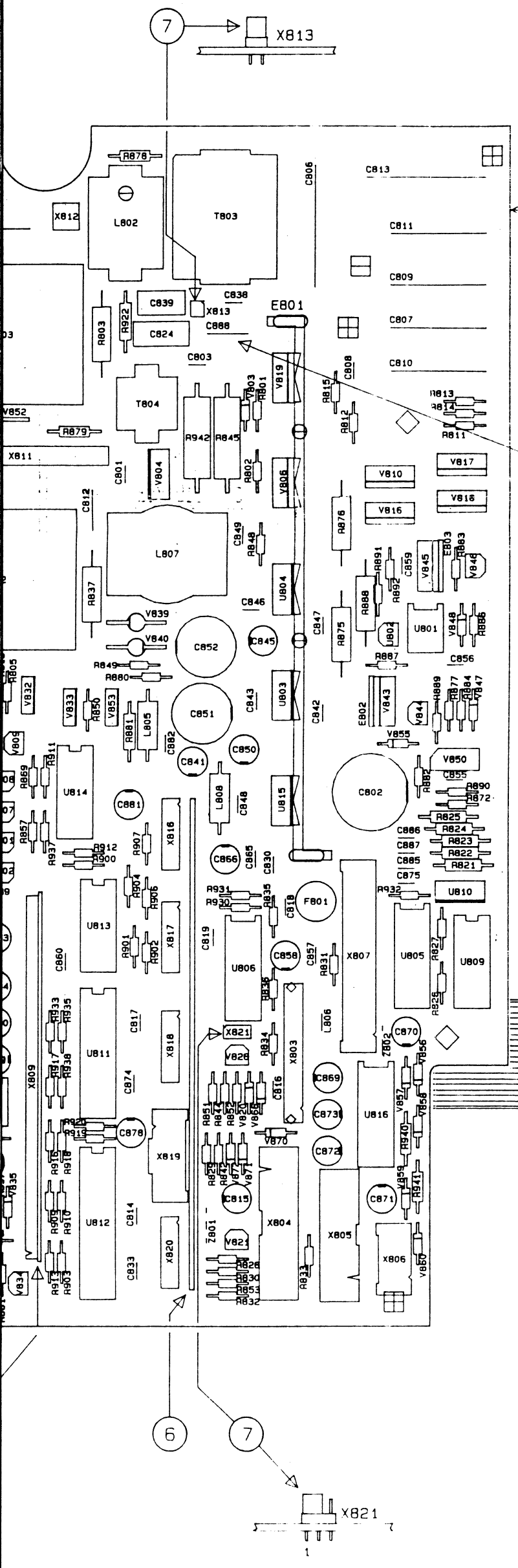
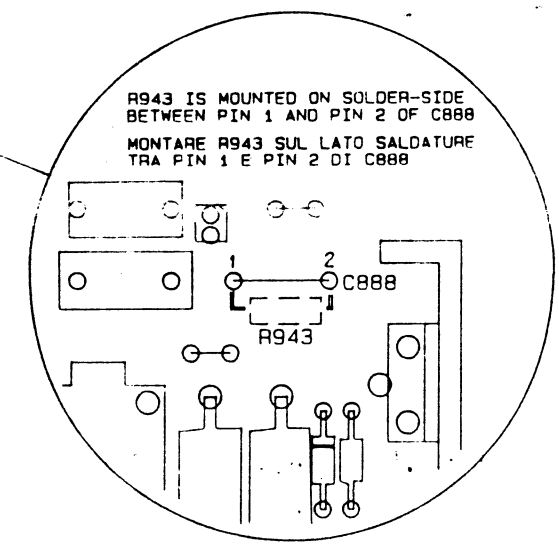
VENDOR SHALL CERTIFY C
ENVIRONMENTAL REQUIREM
RULE : UAN-D1783

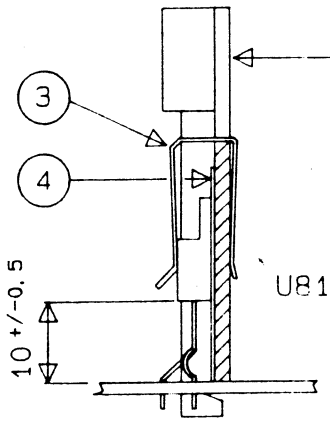
IL FORNITORE DEVE CERT
PREVISTO DALLA NORMA: U



R943 IS MOUNTED ON SOLDER-SIDE BETWEEN PIN 1 AND PIN 2 OF C888

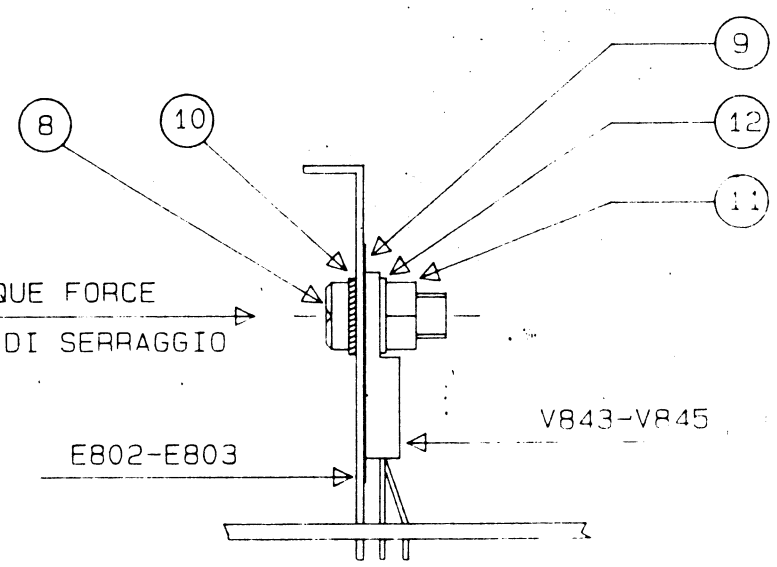
MONTARE R943 SUL LATO SALDATURE TRA PIN 1 E PIN 2 DI C888





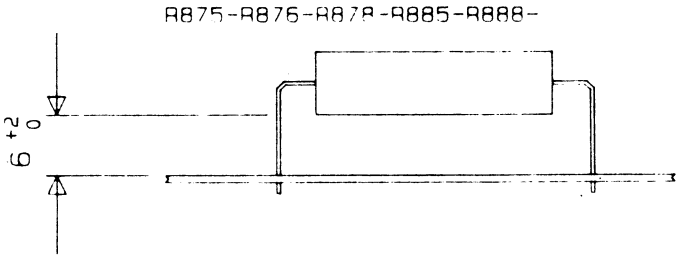
TWIST THE ENDS

TORCERE I TERMINALI

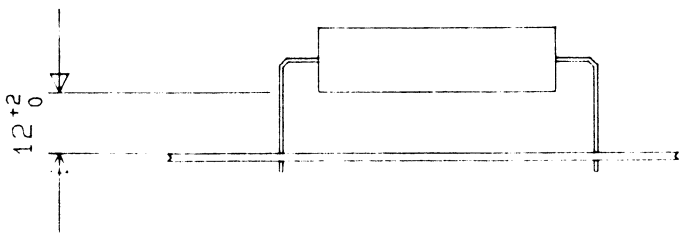


BLACK
NERO

V839-V840-V841
R819-R837-R865-R866-R867-R896-R895-R893
R875-R876-R878-R885-R888-



R803-R807-R845-R942



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COMPLIANCE WITH THE
MENTS ACCORDING TO
B

TIFICARE QUANTO
UAN-D1783

CLASS NO.		C20DAS/BR MAIN BOARD ASSY	3119 208 6355	1 94-01-05
93-11-10	CG			1 94-01-07
				1 94-04-12
203 3604				
NAME VILLA		SUPERS.	1 SH.	SH. 110 — 1
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